#8/13
4/16/2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of Inventor(s): Mills

Group Art Unit: 1754

Appln. Ser. No.: 09/501,622

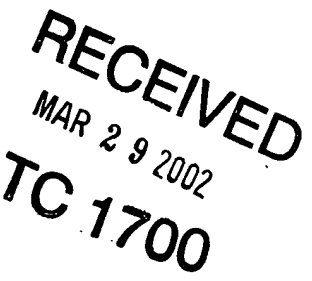
Secret Committee: Langel *for the Secret Committee*

Filing Date: 2/9/00

Title: DOPED SEMICONDUCTOR AND METHOD OF MAKING THE DOPED SEMICONDUCTOR

* * * * *

March 25, 2002
(March 24, 2002 = Sunday)



RESPONSE

Hon. Asst. Commissioner
of Patents and Trademarks
Washington, D.C. 20231

Sir:

Reconsideration and allowance of the subject application are respectfully requested.

Claims 1-265 are pending in the application.

This paper is submitted in response to the Office Action dated September 24, 2001, rejecting 1-265 under 35 U.S.C. §§ 101 and 112, first and second paragraphs.[1]

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[1] Applicant notes that, since the entry of the present Office Action, the PTO has entered Final Office Actions in many of his other pending applications, including, for example, Application Serial No. 09/009, 294. Because Applicant's January 3, 2002 Response to that Final Office Action includes the submission of additional experimental evidence and supporting argument proving the existence of lower-energy hydrogen, which are fully applicable to the present Office Action, the Attachment to that Response is incorporated herein by reference. [See Attachment X for a complete copy of the

#7/US 41/2 1754

Form: PTO/SB/17 (Modified)

REPLY/AMENDMENT FEE TRANSMITTAL		Attorney Docket No.	8AC4-D2
		Application Number	09/501,622
		Filing Date	2/9/00
		First Named Inventor	Mills
		Group Art Unit	1754
AMOUNT ENCLOSED	$ 460	Examiner Name	Langel

FEE CALCULATION (fees effective 10/01/97)

CLAIMS AS AMENDED	Claims Remaining After Amendment	Highest Number Previously Paid For	Number Extra	Rate	Calculations
TOTAL CLAIMS	265	265	0 (3)	X $18.00 =	
INDEPENDENT CLAIMS	2	3	0	X $78.00 =	
Since an Official Action set an original due date of 12/24/01, petition is hereby made for an extension to cover the date this reply is filed for which the requisite fee is enclosed (1 month ($110); 2 months ($400); 3 months ($950); 4 months ($1,510); 5 months ($2,060)): 3 Months					920
If Statutory Disclaimer under Rule 20(d) is enclosed, add fee ($110)					+
				Total of above Calculations =	$920
Reduction by 50% for filing by small entity (37 CFR 1.9, 1.27 & 1.28)					-460
				TOTAL FEES DUE =	$460

(1) If entry (1) is less than entry (2), entry (3) is "0".
(2) If entry (2) is less than 20, change entry (2) to "20".
(4) If entry (4) is less than entry (5), entry (6) is "0".
(5) If entry (5) is less than 3, change entry (5) to "3".

METHOD OF PAYMENT

[X] Check enclosed as payment.

[ ] Charge "TOTAL FEES DUE" to the Deposit Account No., below.

AUTHORIZATION

[X] If the above-noted "AMOUNT ENCLOSED" is not correct, the Commissioner is hereby authorized to credit any overpayment or charge any additional fees under 37 CFR 1.16 or 1.17 necessary to maintain pendency of the present application to:

Deposit Account No.:	50-0687
OrderNo.: (Client/Matter)	62-226

SUBMITTED BY: Manelli Denison & Selter, PLLC

Typed Name	Jeffrey S. Melcher	Reg. No.	35,950
Signature		Date	March 25, 2002

03/27/2002 SSITHIB1 00000119 09501622
01 FC:217 460.00 OP

~~03/27/2002 FALLEN 00000049 09501622~~
~~345.00 OP~~
~~2205.00 OP~~

As an initial matter, Applicant notes that the present Office Action is strikingly similar to prior Office Actions unlawfully issued in Application Serial Nos. 09/009,294; 09/008,947; 09/009,455; 09/111,160; and 09/110,678, which cases had been previously allowed and then withdrawn from issue after the Issue Fee had been paid. As stated in Responses to those prior Office Actions, the PTO's withdrawal from issuance and subsequent rejection of previously-allowed claims after payment of the Issue Fee violated 35 U.S.C. §§ 151 and 37 C.F.R. § 1.131(b). Accordingly, Applicant filed his Responses to those unlawful Office Actions under protest and demanded that the PTO immediately issue those applications as U.S. patents in compliance with all applicable statutes and regulations. Applicant further noted in his prior Responses that all Office Actions, Responses, supporting documents, and other papers introduced into the PTO's official file histories of those applications after payment of the Issue Fees were not properly made part of those file histories.

The present application is allowable for all the same reasons that Applicant's unlawfully withdrawn applications were previously allowed. Indeed, after thoroughly considering Applicant's arguments and the scientific evidence in support of the operability and utility of the Applicant's lower-energy hydrogen technology, the Examiners of record in those prior cases, Wayne Langel and Stephen Kalafut, determined that Applicant was entitled to patents under the law and, as directed by 35 U.S.C. § 151, issued written Notice of Allowances reflecting that entitlement. In response to those Notice of Allowances, Applicant paid the Issue Fees with the expectation that the PTO would comply with the additional statutory directive of Section 151 requiring that "the patent shall issue" once the Issue Fee has been paid.[2]

Attachment.] Also enclosed are three Rule 132 Declarations of Dr. Mills certifying that experimental evidence that has not yet been published. [See Attachment W.] Applicant therefore expects a full response to that additional experimental evidence and supporting argument in the next Office Action or a Notice of Allowance.

[2] These and other arguments made herein are more fully detailed in the attached briefs filed in Applicant's appeal to the Federal Circuit in *BlackLight Power, Inc. v. Q. Todd Dickenson*, Appeal No. 00-1530 (Attachment 52).

Unfortunately, the Patent Office and other "outside forces" had other plans, which resulted in the unlawful withdrawal of those previously-allowed applications from issue and issuance of the pending Office Actions. Even assuming the PTO had the proper statutory authority to withdraw those applications from issue—which it did not—it did so under extremely suspicious circumstances, without even the slightest review of the applications, in violation of 37 C.F.R. § 1.313(b). [See letters to Director Kepplinger, dated March 28, 2000 and January 19, 2001 (Attachments 53 and 54)] That regulation provides in relevant part that once an Applicant has paid the issue fee, an application cannot be withdrawn for any reasons except the "unpatentability of one or more claims."

The PTO has conceded that it never even looked at the withdrawn applications, and, thus, failed to make even a preliminary determination that any of the claims were in fact unpatentable before the decision to withdraw them from issue.[3] [See Briefs filed in Applicant's appeal to the Federal Circuit in *BlackLight Power, Inc. v. Q. Todd Dickinson*, Appeal No. 00-1530 (Attachment 52)]. Having violated the express language of 37 C.F.R. § 1.313(b), the PTO had no valid legal basis for issuing Office Actions in those previously-allowed applications.

Inexplicably, there is no indication in the record that the PTO has properly reviewed the present application files in its entirety in summarily concluding that any of Applicant's claims relating to lower-energy hydrogen, including the present claims 1-265 are unpatentable under 35 U.S.C. §§ 101 and 112. Just like the previous unlawful Office Actions, the present Office Action fails to even address, much less controvert, the considerable scientific evidence already of record, which conclusively demonstrates the operability and utility of Applicant's lower-energy hydrogen technology.[4] Rather than

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[3] Indeed, the PTO in its March 22 Decision in the '294 application indicated that the allowed claims might in fact be patentable, noting that a second Notice of Allowance was one available option upon return of the application to the Examiner.

[4] Despite this glaring omission, Applicant submits herewith additional scientific evidence for the PTO's consideration that destroys any suggestion that the claimed invention is inoperable.

fairly evaluate this "real-world" evidence, the PTO, in its recent Office Actions, presents strained theoretical arguments that do little more than demonstrate its misunderstanding of fundamental scientific principles.

Since the PTO issued blanket Section 101 and 112, first paragraph, rejections, including identical Appendices, in each of Applicant's applications relating to lower-energy hydrogen technology, Applicant, along with his counsel, Jeffrey S. Melcher and Jeffrey A. Simenauer, and BlackLight board member, Dr. Shelby T. Brewer, [5] attended an Interview on February 21, 2001 in a sincere attempt to resolve the Section 101 and 112 issues in all applications simultaneously. Applicant wishes to thank the Examiners of record in those cases, Stephen Kalafut and Wayne Langel, as well as Supervisory Primary Examiner, Steven Griffen, for the courtesy they extended during the Interview.

Other PTO personnel attending the Interview, not of record in the interviewed applications, included Solicitors Stephen G. Walsh and Henry Sawtelle. Applicant's counsel were rebuffed in their attempt to ascertain in what capacity these solicitors were representing the Patent Office and/or the Examiners in attendance. The only information they volunteered in this regard was that they were attending the Interview as "observers."

Because of the unusual circumstances surrounding the proceedings in the interviewed applications, Senator Max Cleland, Chairman of the Senate's Commerce Subcommittee, sent his representative, Donnie Turner, Esq. to attend and observe the Interview.

Also representing the Patent Office at the Interview was Examiner Vasu Jagannathan. Applicant notes that Examiner Jagannathan is not identified as the Examiner of record in any of the interviewed applications, nor does his name appear anywhere else in the files of those cases. The first time Examiner Jagannathan's name had been revealed to Applicant was during recent conversations with Examiner's Kalafut and Langel. [See letter dated January 19, 2001 to Director Kepplinger

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[5] Dr. Brewer received his Masters degree and Ph.D. in nuclear physics from MIT and served as Assistant Secretary of Energy during the Reagan administration.

(Attachment 54)]. Applicant had suspicions that Examiner's Kalafut and Langel were not the true authors of the newly-minted Section 101 and 112 rejections, since the arguments presented were contrary to the positions they had previously taken in allowing six applications relating to Applicant's lower-energy hydrogen. Examiners Kalafut and Langel confirmed Applicant's suspicions and revealed the identity of certain members of a "secret committee" of Examiners, Supervisors and Directors formed to prosecute Applicant's applications "behind the scenes." One of those secret committee members was identified as Examiner Jagannathan. [Id.]

Applicant then contacted Examiner Jagannathan in an attempt to ascertain the true authorship of the recent Office Actions and whether he would attend the Feb. 21st Interview. Regrettably, Examiner Jagannathan took a confrontational tone and flatly refused to admit his role in prosecuting the subject applications, or to answer any other relevant questions relating to the Office Actions. He also refused to attend the Feb. 21st Interview. Only after Applicant sent the January 19, 2001 letter to Director Kepplinger (Attachment 54) was the identity of certain committee members confirmed, including Examiner Jagannathan, who was later instructed to attend the Interview. [See Letter of February 12, 2001 from Director Jacqueline M. Stone (Attachment 55)].

At the Interview, Examiner Jagannathan confirmed that he was not an Examiner of record in any of the pending applications. When formally queried as to his role in formulating the present Office Actions, Examiner Jagannathan again refused to provide any insight on that topic other than revealing his status as a "consultant" and making some vague reference to having provided "input" to Kalafut and Langel, the Examiners of record. From his conduct during the Interview, however, Examiner Jagannathan appeared to be the lead Examiner, as he almost exclusively addressed the merits of the pending Office Actions and was the only one asking technical questions.

Applicant submits that he is entitled to know who on behalf of the Patent Office is responsible for prosecuting the subject applications and the extent to which anyone, including sources from outside the Patent Office, has provided input that resulted in the withdrawal of Applicant's applications from issue and/or the subsequent rejections that

were entered in the pending Office Actions, including the one filed in the present application. To that end, as a preliminary matter, Applicant's counsel posed the following lines of inquiry during the Interview as reasonably related to the prosecution of the pending patent applications (see Attachment to Interview Summary):

1) Identification of all Examiners and/or other Patent Office personnel, other than those identified in the pending Office Actions, who were consulted, or otherwise provided input, in the formulation of the rejections of record;
2) Identification of all outside consultants and/or other technical personnel, including, but not limited to, those of NIST, who were consulted, or otherwise provided input, in the formulation of the rejections of record;
3) Identification of all Patent Office officials responsible for the withdrawal of Application Ser. No. 009,294 and subject application from issuance and clarification of the factual circumstances surrounding that withdrawal; and
4) Identification of any and all outside sources of information that may have precipitated, or otherwise contributed to, the Patent Office's withdrawal of Application Ser. No. 009,294 and the subject application from issuance.

In response to counsel's request for information, Examiner Jagannathan became quite hostile in his insistence that such information was not germane to the issues raised in the pending Office Actions and in his absolute refusal to discuss the matter further. When counsel simply tried to explain why the information requested was in fact germane to prosecution of the pending Office Actions, Examiner Jagannathan became even more acrimonious, threatening to immediately terminate the Interview if discussion on that subject continued.

Applicant takes strong exception to the Secret Committee's refusal to comply with what is clearly a reasonable request for information and hereby renews that request. Applicant is entitled to know the identity, qualifications, and interests of all those who might have played a role in the entry of the pending Office Actions, particularly those persons from outside the Patent Office. Applicant has made the PTO aware of apparent violations of Section 122, including improper disclosures to Dr. Robert Park and outside consultants. [See January 19, 2001 letter to Kepplinger (Attachment 54)]. Applicant is entitled to know the full extent to which confidentiality of his applications has been unlawfully breached. That is the only way Applicant can be provided with an open and honest venue in which to persuade those ultimately responsible for determining the fate of Applicant's applications.

Examiner Jagannathan's involvement in the pending Office Actions is a case in point. Without counsel's investigation that led to the discovery of Examiner Jagannathan's significant participation as part of a "Secret Committee" of Examiners overseeing the subject applications, Applicant would have been denied the benefit of his input at the Interview and the opportunity to present evidence to one of those who will ultimately pass judgment on that evidence.

Furthermore, during the Interview, Examiner Jagannathan articulated numerous positions on behalf of the Patent Office that Applicant learned for only the first time - - positions that would never have been disclosed but for discovery of his previously-kept secret involvement in the prosecution of the subject applications. Examiner Jagannathan's argument that information relating to the identity of those persons, such as himself, involved in the prosecution of these cases and the nature of their involvement is not germane is absurd on its face.

For instance, Applicant learned only at the Interview in response to questions that the amount of experimental evidence that would be necessary to satisfy the Patent Office and allow the applications to issue would depend greatly upon Examiner Jagannathan's personal input as to the sufficiency of that evidence.

Examiner Jagannathan made that point even more clear during the Interview

when Applicant began to present substantial experimental evidence generated by highly-respected independent laboratories, universities and government agencies, reaffirming the operability of his lowered-energy hydrogen technology. In response, Examiner Jagannathan for the first time indicated the PTO's extreme position rejecting such evidence out of hand.

Despite the high reliability of this evidence, Examiner Jagannathan refused to even engage Applicant in any discussions on the merits and indicated that he would only be persuaded by evidence that was "published" in peer-reviewed journals.[6] When Applicant's counsel pointed out that such a standard would be tantamount to Applicant's competition prosecuting the subject applications, Examiner Jagannathan naively asserted that the people reviewing the published data are scientists, not competitors. It goes without saying that labeling the reviewers of Applicant's published data as "scientists" does not necessarily transform them into "non-competitors."

Applicant was also taken aback by Examiner Jagannathan's reaction to the quantity of experimental evidence presented at the Interview, particularly his astonishing request that Applicant "not pile on the evidence."[7] Applicant has gone to considerable lengths and expense to collect experimental evidence that should easily overcome the rejections of record and convince the PTO to allow the subject application to issue. As discussed in detail below, this experimental evidence is not merely cumulative, but demonstrates the operability and enablement of the claimed invention by many different well-known and reliable experimental techniques. Applicant is entitled to have all of

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[6] Although Examiner Jagannathan attempts to impose an improper standard, Applicant has nontheless submitted herewith numerous published articles in esteemed publications, including the International Journal of Hydrogen Technology, Fusion Technology, and the International Journal of Inorganic Materials. See also the publications submitted and discussed in Attachment X.

[7] Examiner Jagannathan would not let Applicant complete his presentation of over 140 slides, which included unbiased, third-party experimental evidence. As for the evidence that was presented, Examiner Jagannathan provided no cogent reasons why that evidence did not demonstrate the existence of lower-energy states of hydrogen.

that evidence fairly considered and evaluated by competent PTO personnel. Unfortunately, Examiner Jagannathan has provided no indication that he is willing to do so.

For instance, Applicant presented numerous spectroscopic data reaffirming enablement of the claimed hydrinos (lower-energy hydrogen). Examiner Jagannathan, however, could not explain why that experimental evidence failed to demonstrate the existence of lower-energy hydrogen. The only response Examiner Jagannathan offered was his misplaced belief that the spectroscopic data was "a bunch of squiggly lines" that could not be interpreted. From these comments, it appears that Examiner Jagannathan is not sufficiently qualified to interpret the experimental data submitted by Applicant.[8] This experimental evidence was prepared by qualified, highly-skilled technicians using state-of-the-art equipment. Contrary to Examiner Jagannathan's assertions, the spectroscopic data presented is not merely "a bunch of squiggly lines," but rather, is capable of highly reliable interpretation by skilled technicians.

Examiner Jagannathan made many other nonsensical arguments during the Interview. One such argument was that the reaction of two potassium ions and a hydrogen atom was impossible because it was a three-body collision. Any chemist skilled in the art would readily understand that three-body collisions occur, but less frequently than two-body collisions. Indeed, the present application recognizes as much in stating that the reaction proceeds faster with reactions involving binary collisions compared to tertiary collisions.

Other sarcastic comments by Examiner Jagannathan during the Interview raise concerns as to whether patentability of the subject application will be given a fair hearing. For instance, in an apparent attempt to discredit Applicant, Examiner Jagannathan sarcastically questioned whether Applicant has ever seen an electron. Despite the derogatory tone of the question, Applicant politely explained the obvious, namely, that no one has seen an electron and that one must rely on experimental data

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[8] During the Interview, Applicant requested that Examiner Jagannathan confer with a competent chemist who understands basic concepts of spectroscopic analysis,

representing the theorized electron, such as scattering data, excited states, electron spin resonance, etc., that only model the electron. If the experimental data conflicts with a presented theory, then the theory must be revised since mere theories do not take precedence over real-world, physical experimental evidence. Applicant's experimental evidence supports Applicant's theory of the electron and the PTO, to this day, has not provided any counter-evidence, or any other cogent reason, to suggest otherwise.

Examiner Jagannathan also sarcastically asked how the disclosed reaction was even possible because the hydrogen atom would not "know" which potassium ion of the identical pair to react with. Nonetheless, Applicant respectfully responded by noting that the Examiner's argument made no sense since it would preclude all symmetrical molecule reactions, which type reactions are well known by chemists. For example, water molecules are symmetrical and, according to the Examiner Jagannathan's argument, water would not be able to exist since the oxygen atom would not "know" which hydrogen atom to react with to form water. This argument by Examiner Jagannathan demonstrates a lack of understanding of basic chemistry and further raises the question as to why he has taken a lead role in prosecuting the present application.

Examiner Jagannathan also misstated that the Schrodinger equation could be extended by incorporation of Maxwell's equations. When pressed by Applicant, he recanted, only to rely on the Dirac equations instead of Maxwell's equations. Applicant further pointed out, without rebuttal by Examiner Jagannathan, that such a solution provides negative kinetic energy states, infinities, virtual particles and negative energy states of a vacuum, all of which are nonsensical and do not represent physical reality. Applicant's full response to these misplaced arguments are fully addressed below in response to the Secret Committee's Section 101 and 112 rejections.

Examiner Jagannathan also incorrectly stated during the Interview that the Schrodinger equation is already defined using Maxwell's equations and, thus, use of

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such as Examiners Kalafut and Langel.

Maxwell's equations to solve the Schrodinger equation for the hydrogen atom is already well established. These allegations are also completely without merit and fully addressed below in response to the Section 101 and 112 rejections.

Applicant also feels compelled to point out that withdrawal of Applicant's previously-allowed applications relating to lower-energy hydrogen and the hostility the PTO has exhibited toward Applicant in prosecuting those applications, as well as the present application, are not isolated incidents. During the same week of February 17, 2000, when Director Kepplinger was pulling Applicant's allowed applications from issuance, an unrelated application of Applicant's, U.S. Serial No. 09/220,970, directed to pattern recognition, was suspiciously transferred to a new Examiner, Bijan Tadayon, and summarily rejected.

Applicant's pattern recognition application had previously been reviewed by the original Examiner and the Section 101 panel of senior Examiners and deemed to contain allowable subject matter. Despite that fact, the new Examiner Tadayon rejected the application in a hostile manner alleging vague deficiencies under Section 101 and 112 similar to what was done in the subject application. Examiner Tadayon also admitted during an Interview that he was not the Examiner responsible for making the Section 101 rejection. Thus, it would appear that the use of "secret committees" to prosecute Applicant's applications behind the scenes is not confined to the subject application.[9]

In view of the unlawful actions of the PTO, reconsideration, allowance and immediate issuance of the subject application as a patent are respectfully requested.

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In responding to the rejections under Section 101 and 112, first paragraph, Applicant has spent an inordinate amount of time and expense compiling experimental

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[9] A copy of the relevant parts of Applicant's Appeal Briefs filed in the '970 application is attached, which further details the PTO's hostile behavior towards Applicant (Attachment 56).

data far beyond that required to demonstrate the utility and enablement of the claimed invention. In the interests of fairness, Applicant expects at the very least that the Secret Committee will fully evaluate the written description and all of the experimental evidence presented. If the Committee disagrees with Applicant's interpretation of the supporting experimental evidence, it should provide a complete scientific basis for what it believes the experimental evidence shows, instead of making vague nonsensical remarks, such as those made regarding the spectroscopic data as only representing "a bunch of squiggly lines" that cannot be interpreted. The Committee should also provide a legitimate basis, complete with full explanation, for any alleged inaccuracies in Applicant's extensive theories, in place of vague remarks about impossibilities and incredibilities, so that Applicant is afforded the opportunity to provide an adequate response. Mere conclusions by the Secret Committee that ambiguous physics, mathematics and scientific laws are broken are insufficient, contrary to patent laws, and impose unfounded barriers to allowance.

In short, Applicant is requesting only what he is due -- that the Secret Committee conduct a fair, open and honest prosecution on the merits as required by the patent laws and rules of procedure.

Section 101 Rejection

The rejection of claims 1-265 under 35 U.S.C. § 101 is respectfully traversed. Applicant submits that the claimed invention fully complies with Section 101 for the following reasons.

The Secret Committee ignores and/or mischaracterizes the evidence of record in rejecting the non-withdrawn claims for lack of utility. Applicant respectfully submits that the Committee has misapplied Section 101 and, for that reason alone, the Section 101 rejection should be withdrawn. The Patent Office procedures outlined in MPEP § 2107, p. 2100-31, mandates the following:

> [The Examiner] should not begin an evaluation of utility by assuming that an asserted utility is likely to be false, based on the technical field of the invention or for other general reasons. . . A conclusion that an asserted

> utility is incredible can be reached only after the Office has evaluated both the assertion of the applicant regarding utility and any evidentiary basis of that assertion. The [Examiner] should be particularly careful not to start with a presumption that an asserted utility is, *per se*, "incredible" and then proceed to base a rejection under 35 U.S.C. 101 on that presumption.

In applying the Section 101 rejection, the Secret Committee violates this mandate and improperly presumes the invention to be *per se* incredible, while ignoring the extensive theoretical explanation and confirming experimental evidence disclosed in the specification. On page 4 of the Office Action, the Secret Committee merely concludes without any basis that "[I]t is clear from the foregoing that fractional values for "n" (or 1/p) cannot exist according to conventional scientific theories." The Secret Committee has provided no reasonable explanation of how the extensive theory disclosed in the present specification is in error or why the supporting experimental evidence does not demonstrate the utility of what Applicant is claiming. The Secret Committee brushes over this extensive disclosure and substitutes its own views, which merely demonstrate its misunderstanding of conventional quantum theory. This failure to follow the Patent Office's own procedures in MPEP § 2107.01 alone mandates that the Section 101 rejection be withdrawn.

Notably, during the Feb. 21st Interview, when Applicant pressed Examiner Jagannathan as to what experimental evidence would be required to persuade him, he responded that he would only consider evidence that was "published" since unpublished experimental evidence was unreliable. He provided no assurances as to what evidence would be sufficient to obtain allowance.

The Secret Committee's requirement that Applicant's evidence be published has no legal basis whatsoever and, in effect, sets a new standard for patentability. This new standard further explains why the experimental evidence disclosed in the present specification and disclosed to original Examiners Kalafut and Langel was ignored in the pending Office Action. In effect, it appears that Examiner Jagannathan requires that Applicant's competitors, other scientists, must first approve of the claimed invention before allowance can even be considered.

This standard is clearly contrary to the established practice courts have laid out for applying Section 101 as summarized in MPEP § 2107.01:

> As a matter of Patent Office practice, a specification which contains a disclosure of utility which corresponds in scope to the subject matter sought to be patented must be taken as sufficient to satisfy the utility requirement of § 101 for the entire claimed subject matter unless there is a reason for one skilled in the art to question the objective truth of the statement of utility or its scope. *In re Langer*, 183 USPQ 288, 297 (CCPA 1974) (Emphasis added.)

Thus, the Patent Office must have adequate support for its challenge to the credibility of Applicant's statements as to utility. Only then does the burden shift to Applicant to provide rebuttal evidence. *In re Bundy*, 209 USPQ 48, 51 (CCPA 1981).

Since the Secret Committee did not properly consider Applicant's disclosure and supporting experimental evidence in making the Section 101 rejection and since the Committee has made unfounded conclusions of incredibility, the burden has not yet shifted to Applicant. For these reasons alone, the Section 101 rejection should be withdrawn.

Even if the burden to demonstrate utility has shifted to Applicant, Applicant has provided more than sufficient disclosure of his theory and supporting evidence to meet that burden and demonstrate the utility of claimed invention. The evidentiary standard to be used throughout the prosecution is a preponderance of the totality of the evidence with due consideration to the persuasiveness of the arguments. *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). MPEP § 2107.01 sets forth the procedures for how this burden is to be met:

> To do this, Office personnel must provide evidence sufficient to show that the statement of asserted utility would be considered "false" by a person of ordinary skill in the art. Of course, a person of ordinary skill must have the benefit of both facts and reasoning in order to assess the truth of a statement. This means that if applicant has presented facts that support the reasoning used in asserting a utility, Office personnel must present countervailing facts and reasoning sufficient to establish that a person of ordinary skill would not believe the applicant's assertion of utility. *In re Brana*, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995). The initial

> evidentiary standard used during evaluation of this question is a preponderance of the evidence (i.e., the totality of the facts and reasoning suggest that it is more likely than not that the statement of the applicant is false) (Emphasis added.)

The Secret Committee has provided no countervailing facts and no credible reasoning that the claimed invention lacks utility. The Committee provides a postulated theory, namely the Schrodinger equation, to support its position. Those skilled in the art know that the Schrodinger equation does not represent physical reality.[10] By definition, a postulated theory cannot take precedence over hard, real-world experimental evidence (described below and in the attached abstracts), especially when that theory does not even represent physical reality. Since filing the present application, Applicant has actually formulated numerous compounds containing hydrinos (lower-energy hydrogen atoms), which have already been fully evaluated and resulted in the allowance of other applications.

As noted above, Examiner Jagannathan summarily dismissed the evidence presented at the Interview for not being "published." Applicant has met this new "published" standard by submitting over 50 scientific papers for publication, 34 of which have been peer-reviewed and either published or accepted for publication in highly-respected scientific journals. It is standard practice for those holding to rigorous scientific due process to submit their results for peer review by Ph.D. physicist and chemist referees who specialize in the field being reviewed. Publication confirms that the methods are scientifically sound in the view of the referees.

Instead of evaluating Applicant's evidence on the merits, the Secret Committee takes a "pot-shot" approach to the theory underlying Applicant's invention, demonstrating its misunderstanding of that theory in the process. For instance, the Secret Committee asserts its mistaken belief on page 4 of the Office Action in that

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[10] Well-known physicists Fuchs and Peres unambiguously acknowledged that "quantum theory does not represent physical reality." C.A. Fuchs and A. Peres, "Quantum Theory Needs No Interpretation," Physics Today, March (2000), p. 70 (Attachment 57).

"Schrodinger's wave equation mandates that the value "n" (or 1/p) must be a positive integer having the values 1, 2, 3, and so on." Those skilled in the art, however, readily understand that the Schrodinger equation provides an infinite number of solutions, most of which are not even integers. Positive integer solutions are only obtained by arbitrarily defining a parameter in the Schrodinger equation. Thus, the Schrodinger equation was forced to fit experimental measurements of the hydrogen atom taken in the late 1800's by defining a constant in the equation. This "curve-fit" definition of the Schrodinger equation is not based on physics.

Clearly, the Secret Committee's elevation of a theory (Schrodinger equation), which was curve-fitted using late 1800-evidence, into a "law" that cannot be broken, while ignoring modern-day evidence that conclusively demonstrates the existence of lower-energy states is a misguided approach. This approach is contrary to established scientific methods of postulating a theory and then testing the accuracy of that theory. Applicant has advanced a sound theory that "n" can have fractional numbers and submitted extensive experimental evidence supporting that theory. The Secret Committee has failed to show otherwise.

The Secret Committee also states on page 4 of the Office Action that "Endnote 5 shows that fractional values for "n" (or 1/p) are also impermissible in light of the Uncertainty Principle." In Endnote 5 the Committee argues that n=1 is justified based on Feynman's argument that the momentum of the electron in the hydrogen atom can be determined from the Uncertainty Principle. This logic is flawed and further demonstrates the Secret Committee's lack of understanding of basic physics. The uncertainty in the momentum – not the momentum itself - may be determined from the Uncertainty Principle. Thus, there is no basis for the Commitee's broad conclusion that fractional quantum numbers are "impermissible in light of the Uncertainty Principle." A further discussion of the Committee's flawed analysis regarding the Uncertainty Principle is discussed below.

The following summary of Applicant's theory and supporting experimental evidence demonstrates the credibility, utility and enablement of the novel method and apparatus utilizing hydrinos and addresses the Committee's Section 101 and 112, first

paragraph, rejections and accompanying Appendix. Applicant again points out that the Secret Committee's Appendix is directed solely to the Applicant's theory and excludes discussion of the extensive supporting experimental evidence. Since we all live in the real physical world, real-world experimental data must take precedence over theories, including those portions of quantum theory referred to in the Appendix. This is especially true when the quantum theory cited makes nonsensical, nonphysical predictions, such as non-causality, spooky actions at a distance, perpetual motion, infinities, violations of conservation of energy, virtual particles that are undetectable, an infinite cosmological constant, and negative energy states of the vacuum.

Moreover, the Secret Committee's arguments against patentability, which are based on the electron being a point charge, do not directly address Applicant's theory, which is not based on the electron being a point charge. In other words, to use an analogy, the Applicant is claiming "apples" while the Committee is attacking "oranges." Applicant requests that the Committee compare "apples" to "apples" and, thus, address the claimed invention and not quantum theories unrelated to the claimed invention.

Even though a patent Applicant is not necessarily required to understand precisely how or why his invention works, Applicant provided most of the following additional information relating to his theory in order to provide further guidance to the Secret Committee in a submission dated May 1, 2000 in his co-pending applications, more than a year before issuance of the pending Office Action, and provides additional copies with this Response:

- R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL, in press (Attachment 4).
- R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Il Nuovo Cimento, submitted (Attachment 5).

- R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).
- R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).
- R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

Should the Secret Committee disagree with any part of Applicant's theory, Applicant requests that the Committee provide specific reasons in support of its position, rather than making broad conclusory statements about violating various unidentified laws of science, physics and mathematics as previously alleged.

Applicant's claimed invention and his theory are supported by extensive experimental data disclosed in the original specification, as well as evidence provided herewith in Attachments 1 through 51, most of which was already considered by Examiners Kalafut and Langel in obtaining the initial allowance of his other applications. and completely ignored by the Secret Committee in issuing the present Office Action. Since the amount of experimental evidence is voluminous, Applicant has only summarized some of those test results in this written Response. A more detailed summary is also included along with each attached test report.

The submitted experimental evidence includes highly reliable data generated from unbiased, laboratories, government agencies and universities, in the form of Rule 132 Declarations, published articles and theses, and technical reports. This experimental evidence far exceeds the legal standards set by courts for meeting the requirements of Sections 101 and 112, first paragraph.

To the extent that the Secret Committee disagrees with Applicant's interpretation of the experimental evidence, Applicant requests that it provide a complete explanation of what it believes the evidence demonstrates, along with any supporting scientific

evidence of its own. Mere conclusions or nonsensical statements, such as those presented by Examiner Jagannathan at the Interview, that Applicant's spectroscopic data is "a bunch of squiggly lines" that cannot be interpreted, do nothing to advance the prosecution of the subject application.

- Recent analysis of mobility and spectroscopy data of individual electrons in liquid helium provide direct experimental confirmation that electrons can have the claimed fractional principal quantum energy levels.
  - R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

- The only pure elements that were observed to emit EUV are those in which the ionization of t electrons from an atom to a continuum energy level is such that the sum of the ionization energies of the t electrons is approximately $m \cdot 27.2 eV$ where t and m are each an integer. This evidence experimentally validates that the claimed catalyst is capable of accepting energy of a multiple of about 27.2 eV from hydrogen atoms.
  - R. Mills, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", Int. J. Hydrogen Energy, submitted (Attachment 2).
  - R. Mills, N. Greenig, S. Hicks, "Optically Measured Power Balances of Anomalous Discharges of Mixtures of Argon, Hydrogen, and Potassium, Rubidium, Cesium, or Strontium Vapor", Int. J. Hydrogen Energy, submitted (Attachment 3).
  - R. Mills and M. Nansteel, "Anomalous Argon-Hydrogen-Strontium Discharge", IEEE Transactions of Plasma Science, submitted (Attachment 6).
  - R. Mills, M. Nansteel, and Y. Lu, "Anomalous Hydrogen-Strontium Discharge", European Journal of Physics D, submitted (Attachment 10).
  - R. Mills, J. Dong, Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Certain Catalysts", Int. J. Hydrogen Energy, Vol. 25, (2000), pp. 919-943 (Attachment 11).

- R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, in press (Attachment 12).
- R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K2CO3-H-Cell", Int. J. Hydrogen Energy, in press (Attachment 13).
- R. Mills, T. Onuma, and Y. Lu, "Formation of a Hydrogen Plasma from an Incandescently Heated Hydrogen-Catalyst Gas Mixture with an Anomalous Afterglow Duration", Int. J. Hydrogen Energy, in press (Attachment 14).
- R. Mills, M. Nansteel, and Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Strontium that Produced an Anomalous Optically Measured Power Balance", Int. J. Hydrogen Energy, in press (Attachment 15).

• Continuum state emission of Cs^{2+} and Ar^{2+} at $53.3\,nm$ and $45.6\,nm$, respectively, with the absence of the other corresponding Rydberg series of lines from these species confirmed the resonant nonradiative energy transfer of $27.2\,eV$ from atomic hydrogen to the catalysts atomic cesium or Ar^{+}. This evidence further experimentally validates that the claimed catalyst is capable of accepting energy of a multiple of about 27.2 eV from hydrogen atoms.
  - R. Mills, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", Int. J. Hydrogen Energy, submitted (Attachment 2).

• The predicted hydride ion of hydrogen catalysis by either cesium atom or Ar^{+} catalyst is the hydride ion $H^{-}(1/2)$. This ion was observed spectroscopically at $407\,nm$ corresponding to its predicted binding energy of $3.05\,eV$. This evidence demonstrates the existence of the claimed hydride ion having a lower-energy hydrogen (hydrino).
  - R. Mills, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", Int. J. Hydrogen Energy, submitted (Attachment 2).

• Transitions of atomic hydrogen to lower energy levels corresponding to lower-energy hydrogen atoms have been identified in the extreme ultraviolet emission spectrum from

interstellar medium. This experimental evidence further demonstrates the existence of the claimed lower-energy hydrogen (hydrino).

- R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).
- R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, Chapter 40, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

• Lines observed at the Institut Fur Niedertemperatur-Plasmaphysik e.V. by EUV spectroscopy are assignable to transitions of atomic hydrogen to lower energy levels corresponding to lower-energy hydrogen atoms (hydrinos) and the emission from the excitation of the corresponding hydride ions. This experimental evidence further demonstrates the existence of the claimed lower-energy hydrogen (hydrino).

- R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, in press (Attachment 12).

• Institut Fur Niedertemperatur-Plasmaphysik e.V. recorded an anomalous plasma formed with hydrogen-potassium mixtures. When the electric field was set to zero, the plasma decayed with a two second half-life, matching the thermal decay time of the filament, which dissociated molecular hydrogen to atomic hydrogen. This experiment indicated that the emission was due to a reaction of Applicant's novel catalysts with atomic hydrogen, which confirms a new chemical source of power never before observed. The large amount of energy produced cannot be explained by conventional chemistry. This experimental evidence further demonstrates the operability of Applicant's invention.

- R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K2CO3-H-Cell", Int. J. Hydrogen Energy, in press (Attachment 13).

• To test the electric dependence of the emission, the weak electric field of about 1 V/cm was set and measured to be zero in $< 0.5 X 10^{-6} sec$. An anomalous afterglow duration of about one to two seconds was recorded in the case of atoms and ions that ionize to provide a catalyst with a net enthalpy of reaction of an integer multiple of the potential energy of atomic hydrogen to within less than the thermal energies at $\approx 10^3 K$. Since the thermal

decay time of the filament for dissociation of molecular hydrogen to atomic hydrogen was similar to the anomalous plasma afterglow duration, the emission was determined to be due to a reaction of atomic hydrogen with a catalyst that did not require the presence of an electric field to be functional. This experimental evidence further proves Applicant's claimed catalyst mechanism for producing lower-energy hydrogen.

- R. Mills, T. Onuma, and Y. Lu, "Formation of a Hydrogen Plasma from an Incandescently Heated Hydrogen-Catalyst Gas Mixture with an Anomalous Afterglow Duration", Int. J. Hydrogen Energy, in press (Attachment 14).
- R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K2CO3-H-Cell", Int. J. Hydrogen Energy, in press (Attachment 13).

• Lyman series in the EUV represents an energy release 10X hydrogen combustion which is greater than that of any known chemical reaction. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.

- R. Mills, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", Int. J. Hydrogen Energy, submitted (Attachment 2).
- R. Mills, N. Greenig, S. Hicks, "Optically Measured Power Balances of Anomalous Discharges of Mixtures of Argon, Hydrogen, and Potassium, Rubidium, Cesium, or Strontium Vapor", Int. J. Hydrogen Energy, submitted (Attachment 3).
- R. Mills and M. Nansteel, "Anomalous Argon-Hydrogen-Strontium Discharge", IEEE Transactions of Plasma Science, submitted (Attachment 6).
- R. Mills, M. Nansteel, and Y. Lu, "Anomalous Hydrogen-Strontium Discharge", European Journal of Physics D, submitted (Attachment 10).
- R. Mills, J. Dong, Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Certain Catalysts", Int. J. Hydrogen Energy, Vol. 25, (2000), pp. 919-943 (Attachment 11).

- R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, in press (Attachment 12).
- R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K2CO3-H-Cell", Int. J. Hydrogen Energy, in press (Attachment 13).
- R. Mills, T. Onuma, and Y. Lu, "Formation of a Hydrogen Plasma from an Incandescently Heated Hydrogen-Catalyst Gas Mixture with an Anomalous Afterglow Duration", Int. J. Hydrogen Energy, in press (Attachment 14).
- R. Mills, M. Nansteel, and Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Strontium that Produced an Anomalous Optically Measured Power Balance", Int. J. Hydrogen Energy, in press (Attachment 15).

• Institut Fur Niedertemperatur-Plasmaphysik e.V. recorded line emission with a 4° Grazing Incidence EUV Spectrometer that was 100X more energetic than the combustion of hydrogen. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.
  - R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, in press (Attachment 12).

• An energetic plasma in hydrogen was generated using strontium atoms as the catalyst. The plasma formed at 1% of the theoretical or prior known voltage requirement with 4,000-7,000 times less power input power compared to noncatalyst controls, sodium, magnesium, or barium atoms, wherein the plasma reaction was controlled with a weak electric field. The light output for power input increased to 8600 times that of the control when argon was added to the hydrogen strontium plasma. This experimental evidence demonstrates the operability of Applicant's novel catalysts compared to non-catalyst controls. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.
  - R. Mills and M. Nansteel, "Anomalous Argon-Hydrogen-Strontium Discharge", IEEE Transactions of Plasma Science, submitted (Attachment 6).

- R. Mills, M. Nansteel, and Y. Lu, "Anomalous Hydrogen-Strontium Discharge", European Journal of Physics D, submitted (Attachment 10).
- R. Mills, M. Nansteel, and Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Strontium that Produced an Anomalous Optically Measured Power Balance", Int. J. Hydrogen Energy, in press (Attachment 15).

• The optically measured output power of gas cells for power supplied to the glow discharge increased by over two orders of magnitude depending on the presence of less than 1% partial pressure of certain catalysts in hydrogen gas or argon-hydrogen gas mixtures.
- R. Mills, N. Greening, S. Hicks, "Optically Measured Power Balances of Anomalous Discharges of Mixtures of Argon, Hydrogen, and Potassium, Rubidium, Cesium or Strontium Vapor," Int. J. Hydrogen Energy, submitted (Attachment 3).

• Energy balance measured by Pennsylvania State University that was 100X hydrogen combustion. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.
- Phillips, J., Smith, J., Kurtz, S., "Report On Calorimetric Investigations Of Gas-Phase Catalyzed Hydrino Formation" Final report for Period October-December 1996", January 1, 1997, A Confidential Report submitted to BlackLight Power, Inc. provided by BlackLight Power, Inc., Great Valley Corporate Center, 41 Great Valley Parkway, Malvern, PA 19355 (Attachment 34).

• Energy balance measured by a Setaram Differential Scanning Calorimeter which was 10X hydrogen combustion. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.
- R. Mills, W. Good, A. Voigt, Jinquan Dong, "Minimum Heat of Formation of Potassium Iodo Hydride," Int. J. Hydrogen Energy, submitted. (Attachment 1)

• Novel hydrogen compounds containing lower-energy hydrogen have been isolated as products of the reaction of atomic hydrogen with Applicant's novel catalysts, which formed

an anomalous plasma as reported in the EUV studies. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).
- R. Mills, B. Dhandapani, N. Greenig, J. He, "Synthesis and Characterization of Potassium Iodo Hydride", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1185-1203 (Attachment 18).
- R. Mills, B. Dhandapani, M. Nansteel, J. He, T. Shannon, A. Echezuria, "Synthesis and Characterization of Novel Hydride Compounds", Int. J. of Hydrogen Energy, in press (Attachment 20).

• Novel hydride compounds containing lower-energy hydrogen were identified by 1) time of flight secondary ion mass spectroscopy which showed a dominant hydride ion in the negative ion spectrum; 2) X-ray photoelectron spectroscopy which showed novel hydride peaks and significant shifts of the core levels of the primary elements bound to the novel hydride ions; 3) ^1H nuclear magnetic resonance spectroscopy (NMR) which showed extraordinary upfield chemical shifts compared to the NMR of the corresponding ordinary hydrides; and 4) thermal decomposition with analysis by gas chromatography, and mass spectroscopy which identified the compounds as hydrides. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).
- R. Mills, B. Dhandapani, N. Greenig, J. He, "Synthesis and Characterization of Potassium Iodo Hydride", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1185-1203 (Attachment 18).
- R. Mills, B. Dhandapani, M. Nansteel, J. He, T. Shannon, A. Echezuria, "Synthesis and Characterization of Novel Hydride Compounds", Int. J. of Hydrogen Energy, in press (Attachment 20).
- R. Mills, "Novel Inorganic Hydride", Int. J. of Hydrogen Energy, Vol. 25, (2000), pp. 669-683 (Attachment 19).

- R. Mills, "Highly Stable Novel Inorganic Hydrides", Journal of Materials Research, submitted (Attachment 21).
- R. Mills, "Novel Hydrogen Compounds from a Potassium Carbonate Electrolytic Cell", Fusion Technology, Vol. 37, No. 2, March, (2000), pp. 157-182 (Attachment 22).

• The NMR results confirm the identification of novel hydride compounds $MH*X$ wherein M is the metal, X, is a halide, and $H*$ comprises a novel high-binding energy hydride ion. Large distinct upfield resonances were observed at -4.5 ppm ($KH*Cl$), -4.1 ppm ($KH*Br$), -3.2 ppm ($KH*I$), -4.4 ppm ($RbH*F$), and -3.7 ppm ($RbH*I$). The presence of a halide in each compound $MH*X$ does not explain the upfield shifted NMR peak since the same NMR spectrum was observed for an equimolar mixture of the pure hydride and the corresponding alkali halide (MH/MX) as was observed for the pure hydride, MH. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- Gary L. Turner, Rule 132 Declaration. Dr. Turner has been conducting NMR scans for over twenty years and has not observed signals in the region of –4 to -5ppm other than Applicant's claimed compounds (Attachment 50).
- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).
- R. Mills, B. Dhandapani, N. Greenig, J. He, "Synthesis and Characterization of Potassium Iodo Hydride", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1185-1203 (Attachment 18).
- R. Mills, B. Dhandapani, M. Nansteel, J. He, T. Shannon, A. Echezuria, "Synthesis and Characterization of Novel Hydride Compounds", Int. J. of Hydrogen Energy, in press (Attachment 20).

• The synthesis of the novel hydride compounds $MH*X$ wherein M is the metal, X, is a halide, and $H*$ comprises a novel high binding energy hydride ion, containing lower-energy hydrogen, having upfield shifted NMR peaks were readily repeatable. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).

• The NMR results of the identification of novel hydride compounds containing the lower-energy by large distinct upfield resonances was reproduced at Spectral Data Services, University of Massachusetts Amherst, University of Delaware, Grace Davison, and National Research Council of Canada. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).

• The NMR results further confirm the identification of novel hydride compounds MH^* and MH_2^* wherein M is the metal and H^* comprises a novel high binding energy hydride ion. Large distinct upfield resonances were observed at -2.8 ppm and -1.2 ppm in the case of KH^* and CaH_2^*, respectively. Whereas, the resonances for the ordinary hydride ion of KH were observed at 0.7 and 1.1 ppm, and the resonances for the ordinary hydride ion of CaH_2 were observed at 1.2 ppm and 4.4 ppm. The synthesis of alkaline and alkaline earth hydrides, KH^* and CaH_2^*, respectively, with upfield shifted peaks prove that the hydride ion containing the lower-energy hydrogen is different from the hydride ion of the corresponding known compound of the same composition. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).

• Applicant has developed high-power-density, high-temperature, hydrogen gas cells that produce plasma, intense light, power of orders of magnitude greater than that of the combustion of hydrogen at high temperatures, and power densities equal to those of many electric power plants. The plasma is produced chemically by the reaction of atomic hydrogen with Applicant's novel catalysts. The plasma may be converted directly to electricity with high efficiency using a known microwave device called a gyrotron, thus,

avoiding a heat engine such as a turbine. Applicant is working on direct plasma to electricity conversion. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, "BlackLight Power Technology-A New Clean Energy Source with the Potential for Direct Conversion to Electricity", Global Foundation International Conference on "Global Warming and Energy Policy", Dr. Behram N. Kursunoglu, Chairman, Fort Lauderdale, FL, November 26-28, 2000, in press (Attachment 8).

The above-described, extensive experimental evidence is more than sufficient to demonstrate the utility and enablement of the claimed invention and meets all applicable legal standards. Applicant will now address specific comments made by the Secret Committee in the Office Action.

The Secret Committee argues that the Schrödinger equation only permits integer solutions starting at n=1. This is simply not correct. The Schrödinger equation permits a continuum of solutions which **must be arbitrarily defined** to produce integers starting with n=1 as shown in the articles discussed above. See "Schrödinger Theory of the Hydrogen Atom" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9). In fact, an equally valid solution of the Schrödinger equation is the fractional states of the present invention, as shown in Schrödinger States Below n=1" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

On page 4 of the Office Action, the Secret Committee states that conventional quantum theory only permits integer states of hydrogen based on the Uncertainty Principle and cites Endnote 5 of the Attachment to that Office Action for support. In Endnote 5, the Committee cites the Uncertainty Principle as a law of nature and cites Feynman for asserting that no one has found a way around it. This is simply incorrect. Durr et al. have found a way around it, and the Uncertainty Principle was demonstrated experimentally to fail in a test of its

long-touted basis of the wave-particle duality. [S. Durr, T. Nonn, G. Rempe, Nature, September 3, (1998), Vol. 395, pp. 33-37 (Attachment 58).] See also "It has Been Shown Experimentally that the Heisenberg Uncertainty Principle Has Nothing to Do with Wave-Particle Duality" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, pp. 64-65 in press (Attachment 9), which states:

> Feynman states [117], " It is impossible to design an apparatus to determine which hole the electron passes through, that will not at the same time disturb the electrons enough to destroy the interference pattern." If an apparatus is capable of determining which hole the electron goes through, it *cannot* be so delicate that it does not disturb the pattern in an essential way. No one has ever found (or even thought of) a way around the Uncertainty Principle. *So we must assume that it describes a basic characteristic of nature*."
>
> Feynman's position has recently been overturned by an experiment by Durr et al. [118]. According to Gerhard Rempe [119], who lead the Durr et al. experimental team, "*The Heisenberg Uncertainty Principle has nothing to do with wave-particle duality*." Durr et al. report [118], "We show that the back action onto the atomic momentum implied by Heisenberg's position-momentum uncertainty relation cannot explain the loss of interference."

In Endnote 5 the Secret Committee argues that n=1 is justified based on Feynman's argument that the momentum of the electron in the hydrogen atom can be determined from the Uncertainty Principle. This logic is flawed and further demonstrates the Secret Committee's lack of understanding of basic physics. The uncertainty in the momentum – not the momentum itself - may be determined from the Uncertainty Principle. Thus, there is no basis for the Secret Commitee's broad conclusion that fractional quantum numbers are "impermissible in light of the Uncertainty Principle."

The Secret Committee's logic is further shown to be flawed in "The POSTULATED Schrödinger Equation Does Not Explain the Stability of the Hydrogen Atom" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 76-77 (Attachment 9), which states:

Quantum theory does not say why an atom radiates. Quantum states of quantum theory refer to energy levels of probability waves. From these, emission and absorption of radiation is inferred. But quantum theory does not explain why it is emitted or absorbed or why certain states are stable. For example, the Schrödinger equation was postulated in 1926. It does not explain the stability of the hydrogen atom. To say that the atom obeys the Schrodinger equation is nonsensical. Consider the hydrogen atom without regard to the mathematical formula called the Schrodinger equation. Mathematics does not determine physics. It only models physics. The Schrodinger equation is not based on directly testable physical laws such as Maxwell's equations. It only gives correlations and is, in fact, inconsistent with physical laws.

As a historical note:

[My father] said, "I understand that they say that light is emitted from an atom when it goes from one state to another, from an excited state to a state of lower energy."

I said, "That's right."

"And light is kind of a particle, a photon, I think they call it."

"Yes."

"So if the photon comes out of the atom when it goes from the excited to the lower state, the photon must have been in the atom in the excited state."

I said, "Well no."

He said, "Well, how do you look at it so you can think of a particle photon coming out without it having been there in the excited state?"

I thought a few minutes, and I said, "I'm sorry; I don't know. I can't explain it to you."

-Richard P. Feynman, *The Physics Teacher* (September 1969).

As shown in the "Schrödinger States Below n=1" section, the definition of the "ground state" is mathematically purely arbitrary. It is always experimentally observed that the hydrogen atom does not spontaneously emit light once it has achieved an energy level of 13.6 eV. Thus, it is taught in textbooks that atomic hydrogen cannot go below this ground state. But atomic hydrogen having an experimental ground state of 13.6 eV can only exist in a vacuum or in isolation, and atomic hydrogen cannot go below this ground state <u>only when it is in isolation</u>. Atomic hydrogen is extremely reactive, and there is no known composition of matter containing hydrogen in the ground state of 13.6 eV.

Since the Schrödinger equation offers no foundation for the stability of isolated atomic hydrogen, Feynman attempted to find a basis for the definition of the "ground state" in the Heisenberg Uncertainty Principle [137]. Feynman's based his derivation on the determination of the momentum as $p \approx h/a$ from the Uncertainty Principle, wherein he argues, "We need not trust our answer to within factors like 2, π, etc. We have not even defined a very precisely." The kinetic energy follows classically from the momentum, and the electrostatic energy is given classically to give the total energy as

$$E = h^2/2ma^2 - e^2/a \tag{131}$$

Feynman determined the minimum energy in order to solve for the radius of the hydrogen atom.

$$dE/da = -h^2/ma^3 + e^2/a^2 = 0 \tag{132}$$

The result is exactly the Bohr radius.

The Uncertainty Principle [138] is

$$\sigma_x \sigma_p \geq \frac{\hbar}{2} \tag{133}$$

where σ_x and σ_p are given by

$$\sigma_x^2 = \int \psi^* \left(\hat{X} - \langle x \rangle\right)^2 \psi dx \tag{134}$$

$$\sigma_p^2 = \int \psi^* \left(\hat{P} - \langle p \rangle\right)^2 \psi dx \tag{135}$$

The definition of the momentum operator in a *one dimensional* system is [138]

$$\hat{P}_x = -i\hbar \frac{d}{dx} \tag{136}$$

and the position operator is

$$\hat{X} = x \quad (\text{multiply by x}) \tag{137}$$

Based on the Uncertainty Principle, Feynman's derivation of the Bohr radius is flawed on the basis of at least five points:

1) The Uncertainty Principle gives a lower limit to the product of the uncertainty in the momentum and the position - not the momentum and the position. The momentum or position could be arbitrarily larger or smaller than its uncertainty. For example, quantum mechanical textbooks express the movement of the electron, and the Heisenberg Uncertainty Principle is an expression of the statistical aspects of this movement. McQuarrie [15], gives the electron speed in the $n=1$ state of hydrogen as $2.18764 X 10^6 m/sec$. Remarkably, the uncertainty in the electron speed according to the Uncertainty Principle is $1.4 X 10^7 m/sec$ [16], which is an order of magnitude larger than the speed and, thus, nonsensical.

2) Feynman's derivation of the Bohr radius is internally inconsistent since the kinetic and electrostatic energies were derived classically; whereas, quantum mechanics and the Uncertainty Principle are not consistent with classical mechanics.

3) Feynman's derivation of the Bohr radius is internally inconsistent since the Uncertainty Principle requires uncertainty in the position and momentum. Yet, Eqs. (2.10-2.11) of Feynman (Eqs. (131-132)) can be solved to give an EXACT rather than a most probable electron position, momentum, and energy.

4) Feynman's derivation of the Bohr radius is flawed since Eq. (2.11) of Feynman (Eq. (132)) is nothing more than the Bohr force balance equation given by McQuarrie [139] and also derived by Mills [7]. Thus, this approach fails at explaining the stability of the 13.6 eV state beyond an arbitrary definition wherein "We need not trust our answer to within factors like 2, π, etc. [137]."

5) The faulty logic is compounded by the fact that the Uncertainty Principle is founded on the definition of the momentum operator given by Eq. (136) and the position operator given by Eq. (137). Thus, the Uncertainty Principle is based on the postulated Schrödinger equation and its associated postulates and descriptions of particles as probability waves. It is not based on physics. In fact, it is nonsensical in many physical, real-world tests, such as scattering of electrons from neutral atoms, confining electrons to atoms, confining electrons to atoms in excited states, wherein a photon causing a transition carries $\hbar$ of angular momentum, and the cosmological consequences of the Uncertainty Principle as described previously. Also, it is disproved experimentally that it provides a basis for the wave-particle duality nature of light and particles; even though, the opposite is widely touted as discussed in the "It has Been Shown Experimentally that the Heisenberg Uncertainty Principle Has Nothing to Do with Wave-Particle Duality" section.

According to the generally accepted Born interpretation of the meaning of the wavefunction, the probability of finding the electron between r,θ,ϕ and $r+dr,\theta+d\theta,\phi+d\phi$ is given by Eq. (130). The electron is viewed as a discrete particle that moves here and there (from $r=0$ to $r=\infty$), and $\Psi\Psi^*$ gives the time average of this motion. The Schrödinger equation possesses terms corresponding to the electron radial and angular kinetic energy which sum with the potential energy to give the total energy. These are necessary conditions for an electron bound by a central field [11]. Herman Haus derived a test of radiation based on Maxwell's equations [18]. Applying Haus's theorem to the point particle that must have radial kinetic energy demonstrates that the Schrödinger solution for the $n=1$ state of hydrogen is

radiative; thus, it violates Maxwell's equations. Since none is observed for the $n=1$ state, QM is inconsistent with observation. The derivation is shown in the " Schrödinger Wave Functions in Violation of Maxwell's Equations" section of Mills [140].

In contrast, Applicant's theory is derived from Maxwell's equation with the constraint that the $n=1$ state is nonradiative. This approach leads to the prediction of stable states below the traditional $n=1$ state. Corresponding states are confirmed by the data on the free electrons in superfluid helium and other experimental test results described above.

In addition, the Uncertainty Principle is experimentally disproved since it predicts nonlocality, noncausality, spooky actions at a distance, and perpetual motion. See the "The Heisenberg Uncertainty Principle Predicts Nonlocality, Noncausality, Spooky Actions at a Distance, and Perpetual Motion which can be Shown to be Experimentally Incorrect" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

The Uncertainty Principle is experimentally disproved since it predicts an essentially infinite cosmological constant as given in the "Quantum Electrodynamics is Purely Mathematical and Has No Basis in Reality' section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 55-56 (Attachment 9), which states:

> The Rutherford experiment demonstrated that even atoms are comprised of essentially empty space [95]. Zero-point field fluctuations, virtual particles, and states of negative energy and mass invoked to describe the vacuum are nonsensical and have no basis in reality since they have never been observed experimentally and would correspond to an essentially infinite cosmological constant throughout the entire universe including regions of no mass. As given by Waldrop [96], "What makes this problem into something more than metaphysics is that the cosmological constant is observationally zero to a very high degree of accuracy. And yet, ordinary quantum field theory predicts that it ought to be enormous, about 120 orders of magnitude larger than the best observational limit. Moreover, this prediction is almost inescapable because it is a straightforward application of the Uncertainty Principle, which in this case states that every quantum field contains a certain, irreducible amount of energy even in empty space. Electrons, photons, quarks--the quantum field of every particle contributes. And that energy is exactly equivalent to

> the kind of pressure described by the cosmological constant. The cosmological constant has accordingly been an embarrassment and a frustration to every physicist who has ever grappled with it."

In view of the lack of any facts or evidence provided by the Secret Committee, its flawed statements regarding the postulated theory embodied in the Schrodinger Equation, and the extensive reasoning (theory) and supporting experimental evidence provided by Applicant, Applicant submits that the preponderance of evidence weighs strongly in favor of his meeting the utility requirements of Section 101. Accordingly, withdrawal of the Section 101 rejection is respectfully requested.

Section 112, First Paragraph, Rejection

The rejection of the claims 1-265 under 35 U.S.C. § 112, first paragraph, is respectfully traversed. Applicant submits that all of the non-withdrawn claims fully comply with Section 112, first paragraph, for the following reasons.

Applicant has previously satisfied the legal requirements of Section 112, first paragraph, as defined by the courts, in obtaining the initial allowance of his other applications relating to lower-energy hydrogen technology. In meeting those legal requirements, Applicant has disclosed detailed written description, including reproducible working examples, and extensive supporting experimental evidence.

Section 112, first paragraph, requires nothing more than objective enablement. In making a rejection for lack of enablement, it is incumbent upon the Secret Committee to explain <u>why</u> the objective truth of the disclosure is doubted and to back up such assertions with acceptable objective evidence or reasoning in support thereof before the burden to show enablement shifts to Applicant. Only in this manner does Applicant have a fair opportunity to overcome the Secret Committee's doubts by submitting suitable proof that the specification is indeed enabling. A specification that teaches how to make and use the invention, either by illustrative examples or by broad terminology, in terms that correspond in scope to the claims <u>must</u> be taken as complying with the first paragraph of 112, <u>unless</u> there is reason to doubt the objective truth of the statements

relied upon therein for enabling support. *In re Marzocchi,* 169 USPQ 367 (CCPA 1977); MPEP § 2164.05.

Applicant submits that the Secret Committee has not met its burden to show nonenablement and, therefore, the burden to rebut that showing has not shifted to Applicant. The record is completely devoid of any evidence from the Secret Committee that is inconsistent with Applicant's statements regarding his lower-energy hydrogen technology and, thus, there has not been shown any reason to doubt Applicant's statements. For this reason alone the Section 112 rejection should be withdrawn.

In rejecting the claims under Section 112, first paragraph, the Secret Committee has, in effect, constructed an impenetrable barrier to patentability. The Secret Committee states on page 7 of the Office Action that "in order to establish enablement, the applicant bears the burden of proving accepted scientific laws wrong or incomplete." The Secret Committee, however, points to no statute, rule, or established case law - - nor can it - - that provides legal support for this newly-minted standard. Incredibly, the Secret Committee fails to even identify any scientific law that Applicant's invention supposedly violates under this fictional standard.

Contrary to the Secret Committee's new standard, case law provides that Applicant need not even know how or why his invention works and, therefore, no theory of the invention need be disclosed. *Diamond Rubber Co. v. Consolidated Rubber Tire Co.*, 220 U.S. 428, 435-36 (1911); *In re Isaacs and Lindenmann*, 146 USPQ 193, 197 (CCPA 1965); *Tapco Prods. Co. v. Van Mark Prods. Corp.,* 170 USPQ 550 (6th Cir. 1971). Thus, Applicant has gone far beyond what the patent laws require in providing a detailed theory of how and why his invention works, as well as eperimental evidence to support that theory.

Despite this showing, the Secret Committee improperly fails to properly address the experimental evidence of record in making the Section 112 rejection. In view of the exorbitant cost to Applicant in collecting and presenting this evidence, the Committee should, at the very least, consider it and if it is deemed to be insufficient, inform Applicant as to why it believes that to be so and what type of experimental evidence

would be sufficient to persuade the Committee to withdraw its rejection under Section 112.

(1) The Quantity of Experimental Necessary

In support of its non-enablement argument, the Secret Committee provides only conclusory, misguided statements, such as the following:

> Pages 41 and 42 of applicant's specification show that hydrino hydride was prepared during the electrolysis of an aqueous solution of K2CO3 corresponding to the catalyst K+/K+. However, U.S. patent 4,337,126 (Gilligan, III et al.) (newly cited) is evidence that the electrolysis of potassium carbonate results in the production of potassium hydroxide and CO2... Pages 53-59 of the specification disclose various methods to isolate and purify the increased binding energy hydrogen compounds formed in the hydride reactor. The paragraph bridging pages 56 and 57 discloses how increased binding energy hydrogen compounds may be isolated from the electrolyte of a K2CO3 electrolytic cell. However, there are not sufficient details of the electrolysis conditions set forth on pages 41 and 42 which would allow one to isolate and purify the increased binding energy hydrogen compounds by the procedures set forth in the paragraph bridging pages 56 and 57, rather than simply produce potassium hydroxide and CO2 by the potassium carbonate electrolysis, as shown by Gilligan, III et al. In this regard, the specification must teach a person having ordinary skill in the art how to make and use the invention, not merely how the applicant may find out and use the invention himself, *in re Garnder*, 427 F.2d 786, 789, 166 USPQ 138, 141 (CCPA 1970). [Page 5 of the Office Action]

Incredibly, the Secret Committee ignores over 30 different experimental examples in the 126-page specification and focuses on only three pages and one example, the K_2CO_3 electrolytic cell, and the Gilligan patent, to support its conclusions. In citing Gilligan, the Secret Committee improperly concludes that lower-energy hydrogen compounds cannot be made, without even considering the extensive spectroscopic data shown in Figs. 11-26 and 37-39 of the present application that confirms the presence of the lower-energy hydrogen formed in Applicant's electrolytic cell.

Compounding the Secret Committee's error is its suggestion that Applicant's electrolytic cell produces KOH in accordance with the teachings of Gilligan. Gilligan merely

teaches that if an electrolytic cell is operated at a high current density, it is possible to convert K_2CO_3 to KOH. Applicant's invention, however, is not limited to low or high current density. Rather, Applicant is using the current density to generate hydrogen atoms that are then reacted with Applicant's novel catalysts to form lower-energy hydrogen. For example, the experimental cell disclosed in the present invention and cited by the Secret Committee was operated at a low current density of about 1 milliamp per square centimeter, which is contrary to the teachings of Gilligan. Analysis of a cell that had run continuously for 15 months clearly showed that the cell contained predominately K_2CO_3 instead of KOH, as would be predicted by Gilligan. The Secret Committee's reliance on Gilligan, therefore, has no bearing on the claimed invention, since Gilligan simply does not teach or suggest the formation of lower-energy hydrogen compounds.

The spectroscopic and analytical data from the examples disclosed in the present specification clearly demonstrate that the written description adequately teaches the production and isolation of the claimed chemical compounds in accordance with the enablement requirements of Section 112. The specification teaches how to make the claimed novel compounds using an electrolytic cell (page 42 line 20 to page 45 line 15). Applicant teaches the isolation of the claimed compounds (page 56 line 6 to page 60 line 25). Ten working examples of synthesis and isolation from the K_2CO_3 electrolytic cell are given on page 96 line 20 to page 101 line 31. Novel hydride compounds were in fact isolated and dispositively identified.

The production of the claimed novel hydrogen compounds identified by XPS is shown in FIGURE 21 and on page 93 line 26 to page 105 line 5.

The production of the claimed novel hydrogen compounds identified by XRD is shown in Table 9, 10, and 11 on page 146-148 and FIGURES 50 and 51, which also showed that the samples contained a substantial amount of K_2CO_3. The elemental analysis also showed that the samples contained a substantial amount of K_2CO_3 as given on page 147 line 24-30.

ToF-SIMS spectra confirmed the production and isolation of novel hydrino hydrogen compound $KHKOH$ as given in Table 13 on page 166, Table 22 on page 190, and in FIGURE 60.

The production of the claimed novel hydrogen compounds identified by FTIR is shown in FIGURES 68 and 69. The background spectrum closely matches that of K_2CO_3. The novel features that identify the novel lower-energy hydrogen compounds are given on page 211 line 1 to page 212 line 1.

The production of the claimed novel hydrogen compounds identified by Raman spectroscopy is given in FIGURES 71 and 72. The novel features that identify the novel lower-energy hydrogen compounds are disclosed on page 215 line 30 to page 218 line 11. In addition, K_2CO_3 and K_2CO_3 were also present as given in Tables 35 and 36 on pages 216 and 217, respectively.

In addition to the extensive experimental data disclosed in the present specification, Applicant has submitted extensive experimental data [R. Mills, "Novel Inorganic Hydride", Int. J. of Hydrogen Energy, Vol. 25, (2000), pp. 669-683 (Attachment 19); R. Mills, "Highly Stable Novel Inorganic Hydrides", Journal of Materials Research, submitted (Attachment 21); R. Mills, "Novel Hydrogen Compounds from a Potassium Carbonate Electrolytic Cell", Fusion Technology, Vol. 37, No. 2, March, (2000), pp. 157-182 (Attachment 22)], which shows the formation of a novel inorganic hydride compound $KH\,KHCO_3$ that is stable in water and comprises a high binding energy hydride ion containing lower-energy hydrogen was isolated following the electrolysis of a K_2CO_3 electrolyte. Inorganic hydride clusters $K[KH\,KHCO_3]_n^+$ were identified by Time of Flight Secondary Ion Mass Spectroscopy. Moreover, the existence of a novel hydride ion has been determined using X-ray photoelectron spectroscopy, and proton nuclear magnetic resonance spectroscopy.

These test procedures are quite sophisticated and were conducted by highly-trained technicians. It is improper for the Secret Committee to wholly ignore this test data simply because it believes, as Secret Committee Member Jagannathan stated during the Interview, that the data represents "a bunch of squiggly lines" and is, therefore, incapable of being interpreted.

Applicant also finds it difficult to believe that the numerous Examiners, Supervisors, and Directors making up the Secret Committee actually prosecuting this application missed

the extensive synthesis, purification, and analysis disclosure outlined in the Table of Contents. Pages 1-4 of the present specification clearly states:

"13. EXPERIMENTAL

13.1 **Identification of Hydrinos, Dihydrinos, and Hydrino Hydride Ions by XPS (X-ray Photoelectron Spectroscopy)**

13.1.1 Experimental Method of Hydrino Atom and Dihydrino Molecule by XPS

13.1.2 Results and Discussion

13.1.3 Experimental Method of Hydrino Hydride by XPS

13.1.3.1 . Carbon Electrode Samples

13.1.3.2 Crystal Samples from an Electrolytic Cell

13.1.4 Results and Discussion

13.2 **Identification of Hydrino Hydride Compounds by Mass Spectroscopy**

13.2.1 Sample Collection and Preparation

13.2.1.1 Electrolytic Sample

13.2.1.2 Gas Cell Sample

13.2.1.3 Gas Discharge Cell Sample

13.2.1.4 Plasma Torch Sample

13.2.2 Mass Spectroscopy

13.2.3 Results and Discussion

13.3 **Identification of Hydrino Hydride Compounds by Mass Spectroscopy**

13.3.1 Sample Collection and Preparation

13.3.1.1 Hollow Cathode Electrolytic Samples

13.3.1.2 Control Hydrogen Sample

13.3.1.3 Electrolytic Gasses from Recombiner

13.3.1.4 Gas Cell Sample

13.3.2 Mass Spectroscopy

13.3.3 Results and Discussion

13.4 **Identification of Hydrino Hydride Compounds and Dihydrino by Gas Chromatography with Calorimetry of the Decomposition of Hydrino Hydride Compounds**

13.4.1 Gas Chromatography Methods

13.4.1.1 Control Sample

13.4.1.2 Plasma Torch Sample

13.4.1.3 Coated Cathode Sample
13.4.1.4 Gas Discharge Cell Sample
13.4.2 Adiabatic Calorimetry Methods
13.4.3 Enthalpy of the Decomposition Reaction of Hydrino Hydride Compounds and Gas Chromatography Results and Discussion
13.4.3.1 Enthalpy Measurement Results
13.4.3.2 Gas Chromatography Results
13.4.4 Discussion
13.5 **Identification of Hydrino Hydride Compounds by XRD** (X-ray Diffraction Spectroscopy)
13.5.1 Experimental Methods
13.5.1.1 Spillover Catalyst Sample
13.5.1.2 Electrolytic Cell Samples
13.5.1.3 Gas Cell Sample
13.5.2 Results and Discussion
13.6 **Identification of Hydrino, Hydrino Hydride Compounds, and Dihydrino Molecular Ion Formation by Extreme Ultraviolet Spectroscopy**
13.6.1 Experimental Methods
13.6.2 Results and Discussion
13.7 **Identification of Hydrino Hydride Compounds by Time-of-Flight-Secondary-Ion-Mass-Spectroscopy (TOFSIMS)**
13.7.1 Sample Collection and Preparation
13.7.2 TOFSIMS Spectroscopy
13.7.3 XPS to Confirm TOFSIMS
13.7.4 Discussion
13.8 **Identification of Hydrino Hydride Compounds by Fourier Transform Infrared (FTIR) Spectroscopy**
13.8.1 Sample Collection and Preparation
13.8.2 FTIR Spectroscopy
13.8.3 Results and Discussion
13.9 **Identification of Hydrino Hydride Compounds by Raman**

Spectroscopy

13.9.1 Sample Collection and Preparation

13.9.2 Raman Spectroscopy

13.9.2.1 Nickel Wire Samples

13.9.2.2 Crystal Sample

13.10 **Identification of Hydrino Hydride Compounds by Proton Nuclear Magnetic Resonance (NMR) Spectroscopy**

13.10.1 Sample Collection and Preparation

13.10.2 NMR Spectroscopy

13.10.3 Results and Discussion

13.11 **Identification of Hydrino Hydride Compounds by Electrospray-Ionization-Time-Of-Flight-Mass-Spectroscopy (ESITOFMS)**

13.11.1 Sample Collection and Preparation

13.11.2 ESITOFMS Spectroscopy

13.11.3 Results and Discussion

13.12 **Identification of Hydrino Hydride Compounds by Thermogravimetric Analysis and Differential Thermal Analysis (TGA/DTA)**

13.11.4 Sample Collection and Preparation

13.11.5 TGA/DTA Spectroscopy

13.11.6 Results and Discussion

13.13 **Identification of Hydrino Hydride Compounds 39K Nuclear Magnetic Resonance (NMR) Spectroscopy**

13.13.1 Sample Collection and Preparation

13.13.2 39K NMR Spectroscopy

13.13.3 Results and Discussion

The specification teaches an extraordinary number of specific novel chemical formulas that are representative compounds of the claimed invention. Extensive experimental examples and experimental analyses are also provided. For each section presented below,

experimental examples are provided having novel peaks with identifying assignments that correspond to and identify hydrino hydride compounds according to the present invention as shown in bold type:

13. EXPERIMENTAL

13.1 Identification of Hydrinos, Dihydrinos, and Hydrino Hydride Ions by XPS (X-ray Photoelectron Spectroscopy)

13.1.1 Experimental Method of Hydrino Atom and Dihydrino Molecule Identification by XPS

-Electrode sample from an electrolytic cell which shows hydrino compounds by XPS.

13.1.2 Results and Discussion

13.1.3 Experimental Method of Hydrino Hydride Ion Identification by XPS

13.1.3.1 Carbon Electrode Samples

-Electrode sample from an electrolytic cell which shows hydrino compounds by XPS.

13.1.3.2 Crystal Samples from an Electrolytic Cell

-Crystalline sample purified from an electrolytic cell which shows hydrino by XPS.

-Acidified and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by XPS.

-Two crystalline sample purified from an electrolytic cell which shows hydrino compounds by XPS.

-Acidified and recrystallized crystalline sample purified from an electrolytic cell by TLC method which shows hydrino compounds by XPS.

-Acidified and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by XPS.

-Acidified and recrystallized crystalline sample purified by TLC method from an electrolytic cell which shows hydrino compounds by XPS.

13.1.4 Results and Discussion

13.2 Identification of Hydrino Hydride Compounds by Mass Spectroscopy

13.2.1 Sample Collection and Preparation

13.2.1.1 Electrolytic Sample

-Lithium ion added, acidified, and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by mass spectroscopy.

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by mass spectroscopy.

-Acidified and recrystallized two crystalline samples purified from an electrolytic cell which shows hydrino compounds by mass spectroscopy.

13.2.2.2 Gas Cell Sample

-Three samples prepared with different embodiments of the gas cell which show hydrino compounds by mass spectroscopy.

-Two samples prepared with different embodiments of the gas cell and recrystallized which show hydrino compounds by mass spectroscopy.

13.2.2.3 Gas Discharge Cell Sample

Sample prepared with the gas discharge cell which shows hydrino compounds by mass spectroscopy.

13.2.2.4 Plasma Torch Sample

-Sample prepared with the plasma torch cell which shows hydrino compounds by mass spectroscopy.

13.2.2 Mass Spectroscopy

13.2.3 Results and Discussion

13.3 Identification of the Dihydrino Molecule by Mass Spectroscopy

13.3.1 Sample Collection and Preparation

13.3.1.1 Hollow Cathode Electrolytic Samples

-Samples prepared with a hollow nickel cathode of an electrolytic cell which shows dihydrino by mass spectroscopy.

13.3.1.2 Control Hydrogen Sample

13.3.1.3 Electrolytic Gasses from Recombiner

-Sample prepared by recombining gases from an electrolytic cell and analyzing the noncombustible gas which shows dihydrino by mass spectroscopy.

13.3.1.4 Gas Cell Sample

-Sample prepared from a gas cell run in a Calvet calorimeter which shows dihydrino by mass spectroscopy.

13.3.2 Mass Spectroscopy

13.3.3 Results and Discussion

13.4 Identification of Hydrino Hydride Compounds and Dihydrino by Gas Chromatography with Calorimetry of the Decomposition of Hydrino Hydride Compounds

13.4.1 Gas Chromatography Methods

13.4.1.1 Control Sample

13.4.1.2 Plasma Torch Sample

-Sample prepared with the plasma torch cell which shows hydrino compounds by gas chromatography following thermal decomposition and an abnormal K/I ratio determined by XPS.

13.4.1.3 Coated Cathode Sample

-Sample prepared from the cathode wire of an electrolytic cell which shows hydrino compounds by gas chromatography following thermal decomposition.

13.4.1.4 Gas Discharge Cell Sample

-Sample prepared from an on-line gas discharge cell which shows dihydrino by gas chromatography.

13.4.2 Adiabatic Calorimetry Methods

-Eight samples prepared from the cathode wire of an electrolytic cell which show hydrino compounds by the large enthalpy of decomposition by adiabatic calorimetry.

13.4.3 Enthalpy of the Decomposition Reaction of Hydrino Hydride Compounds and Gas Chromatography Results and Discussion
13.4.3.1 Enthalpy Measurement Results
13.4.3.2 Gas Chromatography Results
13.4.4 Discussion
13.5 Identification of Hydrino Hydride Compounds by XRD (X-ray Diffraction Spectroscopy)
13.5.1 Experimental Methods
13.5.1.1 Spillover Catalyst Sample

-Sample prepared with the gas cell using a spillover catalysts which shows hydrino compounds by XRD.

13.5.1.2 Electrolytic Cell Samples

-Two samples from the cathode of an electrolytic cell which show hydrino compounds by XRD.

Crystalline sample purified from an electrolytic cell which shows hydrino compounds by XRD.

-Two samples from acidification and recrystallization of crystalline samples purified from an electrolytic cell which show hydrino compounds by XRD.

-Lithium ion added, acidified, and recrystallized crystalline sample purified from an electrolytic cell which show hydrino compounds by XRD.

13.5.1.3 Gas Cell Sample

-Sample prepared with the gas cell which shows hydrino compounds by XRD.

13.5.2 Results and Discussion
13.6 Identification of Hydrino, Hydrino Hydride Compounds, and Dihydrino Molecular Ion Formation by Extreme Ultraviolet Spectroscopy
13.6.1 Experimental Methods
13.6.2 Results and Discussion

-Hydrino compounds were identified by EUV spectroscopy on three embodiments of the gas discharge cell and by on-line mass spectroscopy.

13.7 Identification of Hydrino Hydride Compounds by Time-Of-Flight-Secondary-Ion-Mass-Spectroscopy (TOFSIMS)

13.7.1 Sample Collection and Preparation

13.7.2 Time-Of-Flight-Secondary-Ion-Mass-Spectroscopy (TOFSIMS)

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by ToF-SIMS.

-Acidified and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by ToF-SIMS.

Crystalline sample purified from an electrolytic cell by filtration which shows hydrino compounds by ToF-SIMS.

-Acidified and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by ToF-SIMS.

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by ToF-SIMS.

-Two samples purified from a gas cell which show hydrino compounds by ToF-SIMS.

-Two acidified and recrystallized crystalline samples purified by TLC method from electrolytic cells which show hydrino compounds by ToF-SIMS.

-Sample purified from a gas cell which shows hydrino compounds by ToF-SIMS.

13.7.3 XPS to Confirm Time-Of-Flight-Secondary-Ion-Mass-Spectroscopy (TOFSIMS)

13.7.4 Results and Discussion

13.8 Identification of Hydrino Hydride Compounds by Fourier Transform Infrared (FTIR) Spectroscopy

13.8.1 Sample Collection and Preparation

-Crystalline sample purified from an electrolytic cell which shows hydrino by FTIR.

-Acidified and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by FTIR.

13.8.2 Fourier Transform Infrared (FTIR) Spectroscopy

13.8.3 Results and Discussion

13.9 Identification of Hydrino Hydride Compounds by Raman Spectroscopy

13.9.1 Sample Collection and Preparation

13.9.2 Raman Spectroscopy

13.9.1.1 Nickel Wire Samples

-Two samples from the cathode of an electrolytic cell which shows hydrino compounds by Raman spectroscopy.

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by Raman spectroscopy.

13.9.1.2 Crystal Sample

13.9.3 Results and Discussion

13.10 Identification of Hydrino Hydride Compounds by Proton Nuclear Magnetic Resonance (NMR) Spectroscopy

13.10.1 Sample Collection and Preparation

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by proton NMR.

13.10.2 Proton Nuclear Magnetic Resonance (NMR) Spectroscopy

13.10.3 Results and Discussion

13.11 Identification of Hydrino Hydride Compounds by Electrospray-Ionization-Time-Of-Flight-Mass-Spectroscopy (ESITOFMS)

13.11.1 Sample Collection and Preparation

-Sample purified from a gas cell which shows hydrino compounds by ESITOFMS.

-Two crystalline samples purified from an electrolytic cell which show hydrino compounds by ESITOFMS.

-Two samples purified from a gas cell which show hydrino compounds by ESITOFMS.

13.11.2 Electrospray-Ionization-Time-Of-Flight-Mass-Spectroscopy (ESITOFMS)

13.11.3 Results and Discussion

13.12 Identification of Hydrino Hydride Compounds by Thermogravimetric Analysis and Differential Thermal Analysis (TGA/DTA)

13.12.1 Sample Collection and Preparation

-Acidified and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by TGA/DTA.

13.12.2 Thermogravimetric Analysis (TGA) and Differential Thermal Analysis (DTA)

13.12.3 Results and Discussion

13.13 Identification of Hydrino Hydride Compounds by ^{39}K Nuclear Magnetic Resonance (NMR) Spectroscopy

13.13.1 Sample Collection and Preparation

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by ^{39}K NMR.

13.13.2 ^{39}K Nuclear Magnetic Resonance (NMR) Spectroscopy

13.13.3 Results and Discussion

A fair review of the extensive experimental evidence of record, which includes 33 working and reproducible examples disclosed in the present specification, clearly demonstrates to one skilled in the art how to make the claimed compounds without undue

experimentation, as discussed fully in response to the Section 101 rejection. For these reasons alone, the Section 112 rejection should be withdrawn.

Furthermore, no experimental evidence is even required to demonstrate enablement. Enablement may be shown by the written description, which the Secret Committee also has ignored in concluding that the disclosure is nonenabling. *In re Fisher,* 166 USPQ 18, 24 (CCPA 1970); *In re Marzochhi and Horton*, 169 USPQ 367 (CCPA 1971).

Since the Secret Committee has only considered one example out of the many disclosed and has not considered the full written description and spectroscopic data, it has not made a prima facie case of nonenablement and the burden to prove otherwise has not shifted to the Applicant. Even if it were, Applicant's submission of "real world" scientific evidence is more than sufficient to support the adequacy of the written description and to rebut the basis for the Secret Committee's rejection under Section 112, first paragraph. For these reasons alone, the Section 112 rejection should be withdrawn.

(2) The Amount of Direction or Guidance Presented in the Specification

Again, the Secret Committee relies on only one out of over 30 disclosed examples to support its conclusion. Moreover, the Secret Committee did not even fully consider the one example they did select. The Secret Committee merely states that KOH is produced without considering the spectroscopic data disclosed in the Figs. 11-26 and 37-39 of the present application. That data conclusively demonstrates that the sample is not ordinary KOH, but rather a novel compound containing lower-energy hydrogen. Apparently, the Secret Committee has once again improperly presumed that the spectroscopic data is merely a "bunch of squiggly lines" that cannot be interpreted.

The extensive disclosure provided clearly enables one skilled in the art to practice the claimed invention. All such a person would have to do is follow any one of the 33 reproducible examples provided in the present specification or follow the written description.

(3) The Presence or Absence of Working Examples

On page 7 of the Office Action, the Secret Committee states that "[i]t is unclear, however, whether applicant has actually formed and identified the various recited species, since the examples are directed to the electrolysis of aqueous K_2CO_3, which would, as stated above produce KOH and CO_2. The present examples are thus not considered to be working examples." Remarkably, the Committee again excludes the extensive synthesis, purification, and analysis disclosure outlined in the Table of Contents and disclosed in the specification, as discussed in Section (1) above, and the spectroscopic data disclosed in the Figures.

The Secret Committee is simply wrong in concluding that ordinary KOH is produced. The specification discloses spectroscopic analysis conclusively demonstrating that lower-energy hydrogen is produced. Once again, the Committee does not state how Applicant's interpretation of this experimental data is flawed. For this reason alone, the Section 112 rejection should be withdrawn.

(4) The Nature of the Invention

On page 7 of the Office Action, the Secret Committee states that:

> The scientific community has held the belief for decades that hydrogen cannot exist below the "ground state" (n = 1). . . Accordingly, the nature of the invention is such that it would be startling if it were operative, thus requiring greater detail than that found on pages 40-94 of the specification for one of ordinary skill in the art to make and use the claimed invention without undue experimentation.

The Secret Committee's "belief" that hydrogen cannot exist below the ground state (n=1) is apparently based on the Schrodinger equation, since the Secret Committee has provided no other basis for that belief. In effect, the Secret Committee has improperly elevated a "belief (i.e., the Schrodinger equation) into a fundamental law of science that cannot be violated.

Contrary to the Secret Committee's position, the Schrodinger equation is not a law of science. The Schrodinger equation cannot be directly tested and is nonphysical.

Even competent quantum theory aficionados do not believe that quantum theory describes physical reality. Fuchs and Peres, state "Contrary to those desires, quantum theory does not describe physical reality." [C. A. Fuchs and A. Peres, "Quantum Theory Needs No "Interpretation", Physics Today, March (2000), p. 70 (emphasis added)].

Quantum states of quantum theory refer to energy levels of probability waves. From these, emission and absorption of radiation is inferred. Quantum theory, however, does not explain why it is emitted or absorbed or why certain states are stable. The Schrödinger equation was postulated in 1926, and Schrödinger himself realized at the time that his equation was limited. It is not Lorentzian invariant; thus, it violates special relativity. It also does not comply with Maxwell's equations and other first principle laws, which are properly characterized as scientific laws. Schrödinger sought a resolution of the incompatibility with special relativity for the rest of his life. He was deeply troubled by the physical consequences of his equation and its solutions. His hope was that the resolution would make his equation fully compatible with classical physics and the quantization would arise from first principles.

Quantum theory failed to predict the results of the Stern-Gerlach experiment, which indicated the need for an additional quantum number. Quantum electrodynamics was proposed by Dirac in 1926 to provide a generalization of quantum mechanics for high energies in conformity with the theory of special relativity and to provide a consistent treatment of the interaction of matter with radiation. From Weisskopf [Weisskopf, V. F., Reviews of Modern Physics, Vol. 21, No. 2, (1949), pp. 305-315 (Attachment 59)], "Dirac's quantum electrodynamics gave a more consistent derivation of the results of the correspondence principle, but it also brought about a number of new and serious difficulties." These difficulties are discussed below and by R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

The Secret Committee states in Endnote 4 that the Schrödinger equation and Dirac equation can be tested experimentally to an astounding degree of accuracy. In addition, in

the Appendix, page 5, the Committee states, "Furthermore, Mills' theory does not show that the conventional quantum mechanical treatment of the hydrogen atom is theoretically or experimentally flawed." The Secret Committee is wrong on both counts.

Both equations are shown by Mills to be fatally flawed based on many very accurate experimental tests. For example, neither equation is based on first principles, they are internally inconsistent, and are directly disproved by many experiments, such as scattering experiments, mobility of free electrons in superfluid helium, tests of ions in Penning traps, etc. The many experimentally measured failings of both equations are given in R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9); R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23); and Chapters 35-38 of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

For example, the experimental failures of the Schrödinger Equation are presented in "The POSTULATED Schrödinger Equation Fails to Solve the Hydrogen Atom Correctly" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 11-14 (Attachment 9), which states:

> The paper by Mills [7] rigorously analyzes the Schrödinger equation. One of many possible solutions of the postulated Schrödinger equation gives the Rydberg levels as does the theory of Bohr. On this basis alone, it is justified despite its inconsistency with physical laws and numerous experimental observations such as:
>
> • The appropriate eigenvalue must be postulated and the variables of the Laguerre differential equation must be defined as integers in order to obtain the Rydberg formula.
>
> • The Schrödinger equation is not Lorentzian invariant.
>
> • The Schrödinger equation violates first principles including special relativity and Maxwell's equations.

• The Schrödinger equation gives no basis why excited states are radiative and the 13.6 eV state is stable. Mathematics does not determine physics. It only models physics.

• In the time independent Schrödinger equation, the kinetic energy of rotation K_{rot} is given by Eq. (10) where the value of the electron angular momentum L for the state $Y_{lm}(\theta,\phi)$ is given by Eq. (11). The Schrödinger equation solutions, Eq. (10) and Eq. (11), predict that the ground state electron has zero angular energy and zero angular momentum, respectively.

• The Schrödinger equation solution, Eq. (11), predicts that the ionized electron may have infinite angular momentum.

• The Schrödinger equation solutions, Eq. (10) and Eq. (11), predict that the excited state rotational energy levels are nondegenerate as a function of the ℓ quantum number, even in the absence of an applied magnetic field, and the predicted energy is over six orders of magnitude of the observed nondegenerate energy in the presence of a magnetic field. In the absence of a magnetic field, no preferred direction exists. In this case, the ℓ quantum number is a function of the orientation of the atom with respect to an arbitrary coordinate system. Therefore, the nondegeneracy is nonsensical and violates conservation of angular momentum of the photon.

• The Schrödinger equation predicts that each of the functions that corresponds to a highly excited state electron is not integrable and can not be normalized; thus, each is infinite.

• The Schrödinger equation predicts that the ionized electron is sinusoidal over all space and can not be normalized; thus, it is infinite.

• The Heisenberg Uncertainty Principle arises as the standard deviation in the electron probability wave, but experimentally it is not the basis of wave particle duality as shown in the Appendix.

• Quantum mechanical textbooks express the movement of the electron, and the Heisenberg Uncertainty Principle is an expression of the statistical aspects of this movement. McQuarrie [15], gives the electron speed in the $n = 1$ state of hydrogen as $2.18764\ X 10^6\ m/\sec$. Remarkably, the uncertainty in the electron speed according to the Uncertainty Principle

is $1.4 X 10^7\ m/\sec$ [16] which is an order of magnitude larger than the actual speed.

• Experimentally the electron has precise velocity, kinetic energy, and angular momentum. Acquiring these exact properties instantaneously defies all known physical principles.

• The correspondence principle does not hold experimentally.

• The Schrödinger equation does not predict the electron magnetic moment and misses the spin quantum number all together.

• The Schrödinger equation is not a wave equation since it gives the velocity squared proportional to the frequency.

• The Schrödinger equation is not consistent with conservation of energy in an inverse potential field, wherein the binding energy is equal to the kinetic energy and the sum of the binding energy and the kinetic energy is equal to the potential energy.

• The Schrödinger equation permits the electron to exist in the nucleus, which is a state that is physically nonsensical with infinite potential energy and infinite negative kinetic energy.

• The Schrödinger equation interpreted as a probability wave of a point particle can not explain neutral scattering of electrons from hydrogen.

• The Schrödinger equation interpreted as a probability wave of a point particle gives rise to infinite magnetic and electric energy in the corresponding fields of the electron.

• A modification of the Schrödinger equation was developed by Dirac to explain spin, which relies on the unfounded notions of negative energy states of the vacuum, virtual particles, and gamma factors.

The success of quantum mechanics can be attributed to 1.) the lack of rigor and unlimited tolerance to ad hoc assumptions in violation of physical laws, 2.) fantastical experimentally immeasurable corrections, such as virtual particles, vacuum polarizations, effective nuclear charge, shielding, ionic character, compactified dimensions, and renormalization, and 3.) curve fitting parameters that are justified solely on the basis that they force the theory to match the data. Quantum theory is now in a state of crisis with constantly modified versions of matter represented as

> undetectable minuscule vibrating strings that exist in many unobservable hyperdimensions, that can travel back and forth between undetectable interconnected parallel universes. (An analysis of the many failings of quantum mechanics are given in the Appendix.) And, recent data shows that the expansion of the universe is accelerating. This observation has shattered the long-held unquestionable doctrine of the origin of the universe as a big bang [17]. It may be time to reconsider the roots of quantum theory, namely the theory of the hydrogen atom, is long overdue, especially in light of the observation of real electron bubbles in helium, which require that the electron is divisible in order for the Schrödinger equation to explain the increase in conductivity upon irradiation with low energy light. This argument is reinforced by the demonstration that the electron in atoms, the free electron, and the free electron in superfluid helium can be solved physically [according to the Applicant's theory] rather than mathematically in closed form equations from first principles. [Applicant's] predictions match the observations without requiring that the electron is a probability wave or is divisible [into smaller parts].

Clearly, the Schrodinger equation is not a law of science. Thus, the "belief" alleged by the Secret Committee that hydrogen cannot exist below the ground state must give way to extensive experimental evidence of record. Furthermore, the Committee's reliance on only a few pages of the specification and one example is improper and does not support its conclusions of nonenablement and undue experimentation.

The Secret Committee's reliance on the Dirac equation is also unfounded. The Dirac equation violates conservation of energy and causality and presents many predictions that are not representative of physical reality. Some of the many failures of the Dirac equation are disclosed in the "Quantum Electrodynamics is Purely Mathematical and Has No Basis in Reality" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 54-55 (Attachment 9), which states:

> Quantum theory fails to predict the results of the Stern-Gerlach experiment, which indicated the need for an additional quantum number. Quantum electrodynamics was proposed by Dirac in 1926 to provide a generalization of quantum mechanics for high energies in conformity with the theory of special relativity and to provide a consistent treatment of the interaction of matter with radiation. From Weisskopf [90], "Dirac's quantum electrodynamics gave a more consistent derivation of the results of the correspondence principle, but it also brought about a number of new

and serious difficulties." Quantum electrodynamics; 1) does not explain nonradiation of bound electrons; 2) contains an internal inconsistency with special relativity regarding the classical electron radius - the electron mass corresponding to its electric energy is infinite; 3) it admits solutions of negative rest mass and negative kinetic energy; 4) the interaction of the electron with the predicted zero-point field fluctuations leads to infinite kinetic energy and infinite electron mass; and 5) Dirac used the unacceptable states of negative mass for the description of the vacuum; yet, infinities still arise. In 1947, Lamb discovered a $1000\ MHz$ shift between the $^2S_{1/2}$ state and the $^2P_{1/2}$ state of the hydrogen atom. This so called Lamb Shift marked the beginning of modern quantum electrodynamics. In the words of Dirac [91], "No progress was made for 20 years. Then a development came initiated by Lamb's discovery and explanation of the Lamb Shift, which fundamentally changed the character of theoretical physics. It involved setting up rules for discarding ...infinities." Renormalization is presently believed to be required of any fundamental theory of physics [92]. However, dissatisfaction with renormalization has been expressed at various times by many physicists including Dirac [93] who felt that, "This is just not sensible mathematics. Sensible mathematics involves neglecting a quantity when it turns out to be small - not neglecting it just because it is infinitely great and you do not want it!"

Furthermore, Oskar Klein pointed out a glaring paradox implied by the Dirac equation which was never resolved [94]. "Electrons may penetrate an electrostatic barrier even when their kinetic energy, $E - mc^2$ is lower than the barrier. Since in Klein's example the barrier was infinitely broad this could not be associated with wave mechanical tunnel effect. It is truly a paradox: Electrons too slow to surpass the potential, may still only be partially reflected. ...Even for an infinitely high barrier, i.e. $r_2 = 1$ and energies $\approx 1\ MeV$, (the reflection coefficient) R is less than 75%! From (2) and (3) it appears that as soon as the barrier is sufficiently high: $V > 2mc^2$, electrons may transgress the repulsive wall-seemingly defying conservation of energy. ...Nor is it possible by way of the positive energy spectrum of the free electron to achieve complete Einstein causality."

The Rutherford experiment demonstrated that even atoms are comprised of essentially empty space [95]. Zero-point field fluctuations, virtual particles, and states of negative energy and mass invoked to describe the vacuum are nonsensical and have no basis in reality since they have never been observed experimentally and would correspond to an essentially infinite cosmological constant throughout the entire universe including regions of no mass. As given by Waldrop [96], "What makes this problem into something more than metaphysics is that the cosmological

> constant is observationally zero to a very high degree of accuracy. And yet, ordinary quantum field theory predicts that it ought to be enormous, about 120 orders of magnitude larger than the best observational limit. Moreover, this prediction is almost inescapable because it is a straightforward application of the Uncertainty Principle, which in this case states that every quantum field contains a certain, irreducible amount of energy even in empty space. Electrons, photons, quarks--the quantum field of every particle contributes. And that energy is exactly equivalent to the kind of pressure described by the cosmological constant. The cosmological constant has accordingly been an embarrassment and a frustration to every physicist who has ever grappled with it."
>
> The spin of the electron and the Lamb shift are calculated from first principles in closed form by Mills [2]. The spin angular momentum results from the motion of negatively charged mass moving systematically, and the equation for angular momentum, $\mathbf{r} \times \mathbf{p}$, can be applied directly to the wave function (a current density function) that describes the electron. The Lamb shift results from conservation of linear momentum of the photon.

The Secret Committee argues that according to quantum mechanics, the electron can not exist in the nucleus. At Endnote 1, the Secret Committee states, "Note that despite the finite value of the radial wavefunction at the nucleus, the probability of finding the electron in its normal ground state is proportional to $4\pi\rho^2 S^2$ which, of course is zero." In fact, just the opposite is true—according to quantum theory the electron supposedly does exist in the nucleous. Indeed, according to quantum mechanics, the existence of the electron in the nucleus is the basis of spin-nuclear coupling called Fermi contact interaction. [M. Karplus and R. N. Porter, *Atoms and Molecules an Introduction for Students of Physical Chemistry*, The Benjamin/Cummings Publishing Company, Menlo Park, California, (1970), p. 567 (Attachment 60).] The spin-nuclear coupling energy is of the order of $10^{-24}\ J$ despite the infinite Coulombic energy of the electron when supposedly found in the nucleus (i.e. $r \rightarrow 0$ in the Schrödinger equation). This consequence of quantum mechanics is fatally flawed since this state has been experimentally disproved, thus, establishing that the nucleus does not contain electrons [Beiser, A., *Concepts of Modern Physics*, Fourth Edition, McGraw-Hill Book Company, New York, (1978), p. 407 (Attachment 61).]

In contrast, the spin nuclear energies are calculated by Applicant in closed form based on first principles without the requirement that the electron be in the nucleus. The calculations disclosed in Chapter 2 of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16), are in close agreement with the experimental results, which states:

> The total energy of the transition from parallel to antiparallel alignment, $\Delta E_{total}^{S/N}$, is given as the sum of Eqs. (2.98) and (2.99).
>
> $$\Delta E_{total}^{S/N} = \frac{e^2}{8\pi\varepsilon_o}\left[\frac{1}{r_{1-}} - \frac{1}{r_{1+}}\right] - 2\mu_P \frac{\mu_0 e\hbar}{m_e a_H^3}\sqrt{\frac{3}{4}} \quad (2.100)$$
>
> $$\Delta E_{total}^{S/N} = 2.878\,X\,10^{-24}\ J - 3.837\,X\,10^{-24}\ J = -9.592\,X\,10^{-25}\ J \quad (2.101)$$
>
> The energy is expressed in terms of wavelength using the Planck relationship, Eq. (2.65).
>
> $$\lambda = \frac{hc}{\Delta E_{total}^{S/N}} = 21\ cm \quad (2.102)$$
>
> The experimental value from astrophysical studies and from electron spin resonance measurements is $21\ cm$.

A further internal inconsistency exists regarding the Secret Committee's position stated as: "Note that despite the finite value of the radial wavefunction at the nucleus, the probability of finding the electron in its normal ground state is proportional to $4\pi\rho^2 S^2$ which, of course is zero." Since the electron has no volume, based on this logic, the probability that an electron can capture a photon to form an excited state is also zero. This internal inconsistency based on the description of the electron as a point particle probability wave does not arise in Applicant's theory.

Moreover, according to the Standard Model, leptons are point particles, not baryons such as the proton and neutron. The proton has structure and is comprised of more fundamental particles--namely quarks and gluons. The proton has an experimentally measured radius of $r_p = 1.3\,X\,10^{-15}\ m$, not zero as alleged by the Secret Committee. Thus, $4\pi\rho^2 S^2$ is not zero.

In the February 21, 2001 Interview, Examiner Jagannathan challenged Applicant's statement that Dirac's positive solution was first attributed to the proton and was only assigned to the positron after the existence of the positron was discovered. Examiner Jagannathan maintained that the Dirac equation predicted the positron and requested that Applicant produce literature to support otherwise. In response, Applicant provides herewith a citation to Beiser, A., Concepts of Modern Physics, Fourth Edition, McGraw-Hill Book Company, New York, (1978), p. 527 (Attachment 61) wherein the second paragraph states, "An unexpected result of the Dirac theory was its prediction that positive as well as negative electrons should exist. At first it was thought that the proton was the positive counterpart of the electron despite the differences in their masses, but in 1932 a positive electron was unambiguously detected in the flux of cosmic radiation at the earth's surface." Thus, the Dirac equation did not predict the mass and identification of the positron, as the proton was clearly assigned the positive counterpart to the electron.

Applicant further stated during the interview that his theory not only predicts the positron unambiguously, but also predicts its mass. The electron and positron mass calculation appears in the "Lepton" section of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16). The calculation is also given in the invited paper: R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL, in press (Attachment 4), which states:

> **The Electron-Antielectron Lepton Pair**
> A clock is defined in terms of a self consistent system of units used to measure the particle mass. The proper time of the particle is equated with the coordinate time according to the Schwarzschild metric corresponding to light speed. The special relativistic condition corresponding to the Planck energy gives the mass of the electron.

$$2\pi\frac{\hbar}{mc^2} = \sec\sqrt{\frac{2Gm^2}{c\alpha^2\hbar}} \tag{19}$$

$$m_e = \left(\frac{h\alpha}{\sec c^2}\right)^{\frac{1}{2}}\left(\frac{c\hbar}{2G}\right)^{\frac{1}{4}} = 9.1097\,X\,10^{-31}\ kg \tag{20}$$

$$m_e = 9.1097\,X\,10^{-31}\ kg - 18\ eV(\nu_e) = 9.1094\,X\,10^{-31}\ kg \tag{21}$$

$$m_{e\,\text{experimental}} = 9.1095\,X\,10^{-31}\ kg \tag{22}$$

In the February 21st Interview, Secret Committee Member Jagannathan further alleged that Applicant's application use of a nonradiative boundary constraint to solve the Schrodinger wave equation for the current and charge density functions was already well established, i.e., conventional. After repeated inquiry by Applicant of the exact equation to which Examiner Jagannathan was referring, he clarified that the Dirac equation (not the Schrodinger wave equation) was fully compliant with Maxwell's equations. These statements are simply untrue and the Secret Committee provides no support for these unfounded allegations.

In quantum mechanics, the spin angular momentum of the electron is called the "intrinsic angular momentum" since no physical interpretation exists. The Schrodinger equation is not Lorentzian invariant in violation of special relativity. It failed to predict the results of the Stern-Gerlach experiment which indicated the need for an additional quantum number. Quantum electrodynamics was proposed by Dirac in 1926 to provide a generalization of quantum mechanics for high energies in conformity with the theory of special relativity and to provide a consistent treatment of the interaction of matter with radiation. It is fatally flawed. From Weisskopf, "Dirac's quantum electrodynamics gave a more consistent derivation of the results of the correspondence principle, but it also brought about a number of new and serious difficulties."[11] Quantum electrodynamics: 1) DOES

[11] 23. Weisskopf, V. F., Reviews of Modern Physics, Vol. 21, No. 2, (1949), pp. 305-315.

NOT EXPLAIN NONRADIATION OF BOUND ELECTRONS; 2) contains an internal inconsistency with special relativity regarding the classical electron radius - the electron mass corresponding to its electric energy is infinite (the Schrodinger equation fails to predict the classical electron radius); 3) it admits solutions of negative rest mass and negative kinetic energy; 4) the interaction of the electron with the predicted zero-point field fluctuations leads to infinite kinetic energy and infinite electron mass; and 5) Dirac used the unacceptable states of negative mass for the description of the vacuum; yet, infinities still arise. Dirac's equation which was postulated to explain spin relies on the unfounded notions of negative energy states of the vacuum, virtual particles, and gamma factors. All of these features are untenable or are inconsistent with observation. These problems regarding spin and orbital angular momentum and energies and the classical electron radius are nonexistence with CQM solutions.

Furthermore, Dirac's equation, which was postulated to explain spin, relies on the unfounded notions of negative energy states of the vacuum, virtual particles, and gamma factors. All of these features are untenable or are inconsistent with observations. These problems regarding spin and orbital angular momentum and energies and the classical electron radius are nonexistent with Applicant's solutions [R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com; posted at www.blacklightpower.com (Attachment 16)].

Further flaws of the Schrödinger and Dirac equations are given in peer-reviewed journal articles of Applicant:

- R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).
- R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).

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2. R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com;

In the Appendix, page 4, the Secret Committee states, "It is observed that the legitimate use of Green's function which satisfies an equation involving a Dirac delta function type of a "**point source**" (emphasis added) and appears, ultimately under an integral sign as the kernel of an integral equation, does not justify Mill's representation of the electron charge density, which is a "smeared out" charge distribution, as a Dirac delta function as discussed previously."

Applicant's solution for the electron is an **extended particle**, not a point source. The Secret Committee has completely missed the point of Applicant's derivation. The results of Applicant's theory are based on and demonstrate the proposition that classical physical laws describe reality on all scales. Unlike quantum theory, which postulates that different laws apply on the atomic level, the premise of Applicant's theory is that a valid theory must comply with ALL of the following:

- theory must be internally consistent even between widely different phenomena
- Maxwell's equations
- conservation of matter/energy
- conservation of linear and angular momentum
- charge conservation
- first and second law of thermodynamics
- Newton's law in the low speed limit; special relativity otherwise
- general relativity (e.g. Schwarzschild metric)--no cosmological constant; and Newtonian gravitation in the weak field limit (which demands no cosmological constant)
- a vacuum is a vacuum
- constant maximum of the speed of light in a vacuum
- 4 dimensional spacetime
- the only allowed parameters are the measured fundamental constants

A summary of Applicant's approach is provided in R. Mills, "The Nature of Free Electrons in Superfluid Helium - - a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory," Int. J. Hydrogen Energy, in press, pp. 20-22 (Attachment 9) as follows:

Mills Theory-*a classical quantum theory*

One-electron atoms include the hydrogen atom, He^+, Li^{2+}, Be^{3+}, and so on. The mass-energy and angular momentum of the electron are constant; this requires that the equation of motion of the electron be temporally and spatially harmonic. Thus, the classical wave equation applies and

$$\left[\nabla^2 - \frac{1}{v^2}\frac{\delta^2}{\delta t^2}\right]\rho(r,\theta,\phi,t) = 0 \tag{37}$$

where $\rho(r,\theta,\phi,t)$ is the charge density function of the electron in time and space. In general, the wave equation has an infinite number of solutions. To arrive at the solution which represents the electron, a suitable boundary condition must be imposed. It is well known from experiments that each single atomic electron of a given isotope radiates to the same stable state. Thus, Mills chose the physical boundary condition of nonradiation of the bound electron to be imposed on the solution of the wave equation for the charge density function of the electron. The condition for radiation by a moving point charge given by Haus [18] is that its spacetime Fourier transform does possess components that are synchronous with waves traveling at the speed of light. Conversely, it is proposed that the condition for nonradiation by an ensemble of moving point charges that comprises a charge density function is

For non-radiative states, the current-density function must NOT possess spacetime Fourier components that are synchronous with waves traveling at the speed of light.

The Haus derivation applies to a moving charge-density function as well because charge obeys superposition. The Haus derivation is summarized below.

The Fourier components of the current produced by the moving charge are derived. The electric field is found from the vector equation in Fourier space (**k**, w-space). The inverse Fourier transform is carried over the magnitude of $\mathbf{k}$. The resulting expression demonstrates that the radiation field is proportional to $\mathbf{J}_\perp(\frac{\omega}{c}\mathbf{n},\omega)$, where $\mathbf{J}_\perp(\mathbf{k},\omega)$ is the spacetime Fourier transform of the current perpendicular to $\mathbf{k}$ and $\mathbf{n} \equiv \frac{\mathbf{k}}{|k|}$. Specifically,

$$\mathbf{E}_{\perp}(\mathbf{r},\omega)\frac{d\omega}{2\pi}=\frac{c}{2\pi}\int\rho(\omega,\Omega)d\omega d\Omega\sqrt{\frac{\mu_0}{\varepsilon_0}}\mathbf{n}\,X\left(\mathbf{n}\,X\,\mathbf{J}_{\perp}\left(\frac{\omega}{c}\mathbf{n},\omega\right)e^{i\left(\frac{\omega}{c}\right)\mathbf{n}\bullet\mathbf{r}}\right) \quad (38)$$

The field $\mathbf{E}_{\perp}(\mathbf{r},\omega)\frac{d\omega}{2\pi}$ is proportional to $\mathbf{J}_{\perp}\left(\frac{\omega}{c}\mathbf{n},\omega\right)$, namely, the Fourier component for which $\mathbf{k}=\frac{\omega}{c}$. Factors of ω that multiply the Fourier component of the current are due to the density of modes per unit volume and unit solid angle. An unaccelerated charge does not radiate in free space, not because it experiences no acceleration, but because it has no Fourier component $\mathbf{J}_{\perp}\left(\frac{\omega}{c}\mathbf{n},\omega\right)$.

The time, radial, and angular solutions of the wave equation are separable. The motion is time harmonic with frequency ω_n. To be a harmonic solution of the wave equation in spherical coordinates, the angular functions must be spherical harmonic functions. A zero of the spacetime Fourier transform of the product function of two spherical harmonic angular functions, a time harmonic function, and an unknown radial function is sought. The solution for the radial function which satisfies the boundary condition is a delta function

$$f(r)=\frac{1}{r^2}\delta(r-r_n) \quad (39)$$

where $r_n = nr_1$ is an allowed radius. Thus, bound electrons are described by a charge-density (mass-density) function which is the product of a radial delta function ($f(r)=\frac{1}{r^2}\delta(r-r_n)$), two angular functions (spherical harmonic functions), and a time harmonic function. Thus, an electron is a spinning, two-dimensional spherical surface, called an *electron orbitsphere*, that can exist in a bound state at only specified distances from the nucleus as shown in Figure 1. More explicitly, the orbitsphere comprises a two-dimensional spherical shell of moving charge.

The total function that describes the spinning motion of each electron orbitsphere is composed of two functions. One function, the spin function, is spatially uniform over the orbitsphere, spins with a quantized angular velocity, and gives rise to spin angular momentum. The other function, the modulation function, can be spatially uniform—in which case there is no orbital angular momentum and the magnetic moment of the electron orbitsphere is one Bohr magneton—or not spatially uniform—in which case there is orbital angular momentum. The modulation function also rotates with a quantized angular velocity.

The corresponding current pattern of the constant charge function of the orbitsphere corresponding to the spin function comprises an infinite series of correlated orthogonal great circle current loops. The current pattern is generated over the surface by two orthogonal sets of an infinite series of nested rotations of two orthogonal great circle current loops where the coordinate axes rotate with the two orthogonal great circles. Each infinitesimal rotation of the infinite series is about the new x-axis and new y-axis which results from the preceding such rotation. For each of the two sets of nested rotations, the angular sum of the rotations about each rotating x-axis and y-axis totals $\sqrt{2}\pi$ radians.

Some of the results are summarized in the following abstract of R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Il Nuovo Cimento, submitted (Attachment 5), which states:

A theory of classical quantum mechanics (CQM), derived from first principles, successfully applies physical laws on all scales [1]. The classical wave equation is solved with the constraint that a bound electron cannot radiate energy. The mathematical formulation for zero radiation based on Maxwell's equations follows from a derivation by Haus [2]. The function that describes the motion of the electron must not possess spacetime Fourier components that are synchronous with waves traveling at the speed of light. CQM gives closed form solutions for the atom including the stability of the $n = 1$ state and the instability of the excited states, the equation of the photon and electron in excited states, the equation of the free electron, and photon which predict the wave particle duality behavior of particles and light. The current and charge density functions of the electron may be directly physically interpreted. For example, spin angular momentum results from the motion of negatively charged mass moving systematically, and the equation for angular momentum, $\mathbf{r} \times \mathbf{p}$, can be applied directly to the wave function (a current density function) that describes the electron. The magnetic moment of a Bohr magneton, Stern Gerlach experiment, g factor, Lamb shift, resonant line width and shape, selection rules, correspondence principle, wave particle duality, excited states, reduced mass, rotational energies, and momenta, orbital and spin splitting, spin-orbital coupling, Knight shift, and spin-nuclear coupling, ionization of two electron atoms, inelastic electron scattering from helium atoms, and the nature of the chemical bond are derived in closed form equations based on Maxwell's equations. The calculations agree with experimental observations.

For any kind of wave advancing with limiting velocity and capable of transmitting signals, the equation of front propagation is the same as the equation for the front of a light wave. By applying this condition to electromagnetic and gravitational fields at particle production, the Schwarzschild metric (SM) is derived from the classical wave equation which modifies general relativity to include conservation of spacetime in addition to momentum and matter/energy. The result gives a natural relationship between Maxwell's equations, special relativity, and general relativity. It gives gravitation from the atom to the cosmos. The universe is time harmonically oscillatory in matter energy and spacetime expansion and contraction with a minimum radius that is the gravitational radius. In closed form equations with fundamental constants only, CQM gives the deflection of light by stars, the precession of the perihelion of Mercury, the particle masses, the Hubble constant, the age of the universe, the observed acceleration of the expansion, the power of the universe, the power spectrum of the universe, the microwave background temperature, the uniformity of the microwave background radiation, the microkelvin spatial variation of the microwave background radiation, the observed violation of the GZK cutoff, the mass density, the large scale structure of the universe, and the identity of dark matter which matches the criteria for the structure of galaxies. In a special case wherein the gravitational potential energy density of a blackhole equals that of the Plank mass, matter converts to energy and spacetime expands with the release of a gamma ray burst. The singularity in the SM is eliminated.

For a further discussion of Applicant's theory, see:

-R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL, in press (Attachment 4).

- R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

- R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).

- R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

In the Appendix, page 4, the Secret Committee once again wrongly hypothesizes that Applicant's lower-energy states can not exist since "there is no explanation for the catastrophic collapse of the electron into the nucleus as $n \rightarrow \infty$ in the fractional number series, $1/n$, i. e. the hydrino atom implodes and ceases to exist." This is not true based on conservation of energy as disclosed in Chapter 5 of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, distributed by Amazon.com (Attachment 5), as well as the earlier versions of Applicant's book, which are incorporated by reference into the subject application.

Applicant never stated or alleged that the hydrino atom implodes. The Secret Committee has it completely backwards. Applicant's theory does not result in the electron contacting the nucleus, whereas the Schrodinger equation cited by the Secret Committee actually requires that the electron must exist in the nucleus part of the time, as discussed above. These overly simplistic arguments further demonstrate the Secret Committee's improper approach of taking Applicant's teachings out of context and making nonsensical conclusions.

Applicant's teachings clearly state the following:

NEW "GROUND" STATE

Hydrogen atoms can undergo transitions to energy states below the ground state [13.6 eV] until the total potential energy of the proton is converted to relativistically corrected kinetic energy and total energy (the negative of the binding energy). The potential energy V of the electron and the proton separated by the radial distance radius r_1 is,

$$V = \frac{-e^2}{4\pi\varepsilon_o r_1} \tag{5.72}$$

where the radius r_1 is the proton radius given by Eq. (28.1)

$$r_p = 1.3\,X\,10^{-15}\,m \tag{5.73}$$

Substitution of Eq.(5.73) into Eq.(5.72) gives the total potential energy V of the electron and the proton

$$V = \frac{-e^2}{4\pi\varepsilon_o r_p} = 1.1\ \mathrm{X}\ 10^6\ \mathrm{eV} \tag{5.74}$$

Thus, Applicant's theory clearly provides limits on how low of an energy state the electron can be taken using Applicant's novel nonradiative transfer of energy from the hydrogen atom. Applicant's theory does not state that the electron catastrophically collapses into the nucleus and the Secret Committee has no basis for making such an absurd allegation.

(5-7) State of the Prior Art, Relative Skill of Those in the Art, The Predictability or Unpredictability of the Art

It is well known that atomic hydrogen is extremely reactive, but is nonradiative and stable only in vacuum or in isolation. This experimental fact has been used by Applicant to solve the hydrogen atom in a new way based on physical laws, including Maxwell's equations,[12] rather than postulate a probability wave theory in contradiction to physical laws, as is the case with the Schrödinger equation and Dirac equation.[13]

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[12] See R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL, in press (Attachment 4); R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Il Nuovo Cimento, submitted (Attachment 5); R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9); R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23); R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

[13] See R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9); R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).

Energy can also be transferred by nonradiative means, which is the basis of the formation of molecular hydrogen and the mechanisms of phosphors. The newly-discovered nonradiative energy transfer from hydrogen atoms to Applicant's novel catalysts is explained by Applicant in his patent application and in many of his publications discussed herein above. For example, in R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 31-35 (Attachment 9), which states:

The Electron of Atomic Hydrogen Does Not Spontaneously Emit Radiation at the n=1 State, but that Does Not Preclude Radiationless Processes Including Formation of Molecular Hydrogen.

The nonradiative state of atomic hydrogen which is historically called the "ground state" forms the basis of the boundary condition of Mills theory [63] to solve the wave equation. Mills further predicts [64] that certain atoms or ions serve as catalysts to release energy from hydrogen to produce an increased binding energy hydrogen atom called a *hydrino atom* having a binding energy of

$$Binding\ Energy = \frac{13.6\ eV}{n^2} \tag{69}$$

where

$$n = \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, ..., \frac{1}{p} \tag{70}$$

and p is an integer greater than 1, designated as $H\left[\frac{a_H}{p}\right]$ where a_H is the radius of the hydrogen atom. Hydrinos are predicted to form by reacting an ordinary hydrogen atom with a catalyst having a net enthalpy of reaction of about

$$m \cdot 27.2\ eV \tag{71}$$

where m is an integer. This catalysis releases energy from the hydrogen atom with a commensurate decrease in size of the hydrogen atom, $r_n = na_H$. For example, the catalysis of $H(n=1)$ to $H(n=1/2)$ releases $40.8\ eV$, and the hydrogen radius decreases from a_H to $\frac{1}{2}a_H$.

It is taught in textbooks that atomic hydrogen cannot go below the ground state of 13.6 eV. Atomic hydrogen having an experimental ground state of 13.6 eV can only exist in a vacuum or in isolation, and atomic hydrogen cannot go below this ground state in isolation. However, there is no known composition of matter containing hydrogen in the ground state of 13.6 eV. Atomic hydrogen is radical and is very reactive. It may react to form a hydride ion or compositions of matter. It is a chemical

intermediate which may be trapped as many chemical intermediates may be by methods such as isolation or cryogenically. A hydrino atom may be considered a chemical intermediate that may be trapped in vacuum or isolation. A hydrino atom can form a hydride ion or a novel composition of matter. Hydrogen at predicted lower-energy levels, hydrino atoms, have been identified in the extreme ultraviolet emission spectrum from interstellar medium [7]. In addition, new compositions of matter containing hydrogen at predicted lower-energy levels have recently been observed in the laboratory [38, 40-58], which energy levels are achieved using the novel catalysts. Spectroscopic experiments confirm the catalysis of hydrogen [27-44].

The excited energy states of atomic hydrogen are also given by Eq. (69) except that

$$n = 1,2,3,... \tag{72}$$

The $n = 1$ state is the "ground" state for "pure" photon transitions (the $n = 1$ state can absorb a photon and go to an excited electronic state, but it cannot release a photon and go to a lower-energy electronic state). However, an electron transition from the ground state to a lower-energy state is possible by a nonradiative energy transfer such as multipole coupling or a resonant collision mechanism. These lower-energy states have fractional quantum numbers, $n = \frac{1}{\text{integer}}$. Processes that occur without photons and that require collisions are common. For example, the exothermic chemical reaction of $H + H$ to form H_2 does not occur with the emission of a photon. Rather, the reaction requires a collision with a third body, M, to remove the bond energy- $H + H + M \rightarrow H_2 + M^*$ [65]. The third body distributes the energy from the exothermic reaction, and the end result is the H_2 molecule and an increase in the temperature of the system. Some commercial phosphors are based on nonradiative energy transfer involving multipole coupling [66]. For example, the strong absorption strength of Sb^{3+} ions along with the efficient nonradiative transfer of excitation from Sb^{3+} to Mn^{2+}, are responsible for the strong manganese luminescence from phosphors containing these ions. Similarly, the $n = 1$ state of hydrogen and the $n = \frac{1}{\text{integer}}$ states of hydrogen are nonradiative, but a transition between two nonradiative states is possible via a nonradiative energy transfer, say $n = 1$ to $n = 1/2$. In these cases, during the transition the electron couples to another electron transition, electron transfer reaction, or inelastic scattering reaction which can absorb the exact amount of energy that must be removed from the hydrogen atom. Thus, a catalyst provides a net positive enthalpy of reaction of $m \cdot 27.2\ eV$ (i.e. it absorbs $m \cdot 27.2\ eV$ where m is an

integer). Certain atoms or ions serve as catalysts which resonantly accept energy from hydrogen atoms and release the energy to the surroundings to effect electronic transitions to fractional quantum energy levels.

Once formed hydrinos have a binding energy given by Eqs. (71-72); thus, they may serve as catalysts which provide a net enthalpy of reaction given by Eq. (71). Also, the simultaneous ionization of two hydrogen atoms may provide a net enthalpy given by Eq. (71). Since the surfaces of stars comprise significant amounts of atomic hydrogen, hydrinos may be formed as a source to interstellar space where further transitions may occur.

A number of experimental observations lead to the conclusion that atomic hydrogen can exist in fractional quantum states that are at lower energies than the traditional "ground" ($n = 1$) state. For example, the existence of fractional quantum states of hydrogen atoms explains the spectral observations of the extreme ultraviolet background emission from interstellar space [67], which may characterize dark matter as demonstrated in Table 2 of Mills [7].

Laboratory experiments that confirm the novel hydrogen chemistry include extreme ultraviolet (EUV) spectroscopy [27, 29-32, 35-39, 42-44], plasma formation [27-39, 42-44], power generation [28-30, 35, 62], and analysis of chemical compounds [38, 42-58, 62]. For example, lines observed by EUV spectroscopy could be assigned to transitions of atomic hydrogen to lower energy levels corresponding to lower energy hydrogen atoms called hydrino atoms and the emission from the excitation of the corresponding hydride ions formed from the hydrino atoms [29]. The chemical interaction of catalysts with hydrogen at temperatures below 1000 K has shown surprising results in terms of the emission of the Lyman and Balmer lines [27-44] and the formation of novel chemical compounds [38, 40-58]. An energetic plasma in hydrogen was generated by a catalysis reaction at 1% of the theoretical or prior known voltage requirement and with 1000's of times less power input in a system wherein the plasma reaction is controlled with a weak electric field [29-30, 35]. The optically measured output power of gas cells for power supplied to the glow discharge increased by over two orders of magnitude depending on the presence of less than 1% partial pressure of certain of catalysts in hydrogen gas or argon-hydrogen gas mixtures [28]. A hydrogen plasma formed by reacting a catalyst with hydrogen was recorded when there was no electric energy input to the reaction [33-34]. The optically measured output power of gas cells for power supplied to the glow discharge increased by over two orders of magnitude depending on the presence of less than 1% partial pressure of certain of catalysts in hydrogen gas or

> argon-hydrogen gas mixtures [28]. Continuum state emission of Cs^{2+} and Ar^{2+} at $53.3\,nm$ and $45.6\,nm$, respectively, with the absence of the other corresponding Rydberg series of lines from these species confirmed the resonant nonradiative energy transfer of $27.2\,eV$ from atomic hydrogen to atomic cesium or Ar^{+}. The predicted hydride ion of hydrogen catalysis by either cesium atom or Ar^{+} catalyst is the hydride ion $H^{-}(1/2)$. This ion was observed spectroscopically at $407\,nm$ corresponding to its predicted binding energy of $3.05\,eV$ [27].

Based on Applicant's detailed disclosure and reproducible examples, one skilled in the art would easily be able to practice the invention as claimed. Contrary to the Secret Committee's beliefs, the claimed hydrogen species do exist since Applicant has formulated many of compounds containing the lower-energy hydrogen and had them analyzed by independent laboratories. The Secret Committee has failed to show otherwise.

In reaching its misplaced conclusions, the Secret Committee completely ignores the fact that one skilled in the art can easily follow any one of the over 30 examples disclosed in the specification and obtain the same novel compounds and test results obtained by Applicant and over 20 unbiased laboratories, government agencies and universities. The disclosed examples are fully reproducible. Thus, contrary to the Secret Committee, not only would one skilled in the art be able easily predict how any given claimed compound is formed, but such a person would be able to form such compounds without undue experimentation.

(8) Breadth of the Claims

On page 9 of the Office Action, the Secret Committee merely concludes without adequate basis that:

> The claims require the presence of "at least one increased binding energy hydrogen species." It has been shown hereinbefore with respect to the rejection under 35 U.S.C. § 101 for inoperability that the hydrino atom cannot exist.

Considering all of the above factors, one skilled in the art could not make

and/or use the claimed invention without undue experimentation.

The Secret Committee has not met its burden of showing that the hydrino atom (lower-energy hydrogen atom) cannot exist. The Secret Committee relies on mere "beliefs" in the scientific community that this is so, beliefs that Applicant has shown to be mistaken. Moreover, the Secret Committee has used these vague "beliefs" to ignore the extensive experimental evidence of record, which is not even discussed in the Office Action.

Where Applicant has not only demonstrated in theory such hydrino atoms can in fact exist, but has also provided overwhelming experimental evidence confirming that theory, the Secret Committee is obligated to address that evidence head on. Its failure to do so in the pending Office Action merely adds further credibility to Applicant's position.

In view of the detailed written disclosure and extensive experimental evidence of record, Applicant submits that the claimed invention fully complies with Section 112, first paragraph. Accordingly, withdrawal of the Section 112, first paragraph rejection is respectfully requested.

I. The Rejection of Claims 1-271 under 35 U.S.C. § 112, Second Paragraph, is Improper

The rejection of claims 1-265 under 35 U.S.C. § 112, second paragraph, at page 2 of the Office Action is respectfully traversed. Applicant submits that the claimed invention fully complies with Section 112, second paragraph, for the following reasons.

One skilled in the art reading and comprehending the present specification would easily understand the metes and bounds of the claim terms "increased binding energy hydrogen species;" "a desired energy level;" "corresponding ordinary hydrogen species;" and "ordinary hydrogen species."

From page 6, lines 3-6, the specification states that:

> A hydrogen atom with a radius of a_H is hereinafter referred to as "ordinary hydrogen atom" or "normal hydrogen atom." Ordinary hydrogen is characterized by its binding energy of 13.6 eV.
> Hydrinos are formed by reacting an ordinary hydrogen atom with a catalyst having a net enthalpy of reaction of about
> m 27.21 eV
> where m is an integer.
>
> This catalysis releases energy with a commensurate decrease in size of the hydrogen atom, $r_n = na_H$. For example, the catalysis of H(n = 1) to H(n = ½) releases 40.8 eV, and the hydrogen radius decreases from a_H to ½ a_H.

There is nothing vague or indefinite about this statement. One skilled in the art knows very well how to measure binding energy and identify ordinary hydrogen. Similarly, such a person would know how to distinguish Applicant's hydrinos (lower-energy hydrogen) from ordinary hydrogen.

The term "increased binding energy species" is extensively described on pages 7-19 of the present specification. From reading and comprehending page 7, lines 15-27, of the present specification, one skilled in the art would easily understand that the "increased binding energy species" includes, for example, a hydrogen-containing species in which one of the following conditions is met:

(i) a binding energy greater than the binding energy of the corresponding ordinary hydrogen species; or

(ii) a binding energy greater than the binding energy of any hydrogen species for which the corresponding ordinary hydrogen species is unstable or is not observed because the ordinary hydrogen species' binding energy is less than thermal energies or is negative.

Page 8, lines 1-5, teach how to form an "increased binding energy species":

> The increased binding energy hydrogen species are formed by reacting one or more hydrino atoms with one or more of an electron, hydrino atom, a compound containing at least one of said increased binding energy

hydrogen species, and at least one other atom, molecule or ion other than an increased binding energy hydrogen species.[14]

There is nothing vague or indefinite about these statements. The "increased binding energy hydrogen species" comprises at least one hydrino atom, which distinguishes it from "ordinary hydrogen species" that consist of only ordinary hydrogen. To satisfy condition (i) above, one skilled in the art need only measure the respective binding energies. For example, a claimed hydrino-containing compound has a binding energy greater than the corresponding compound that contains only ordinary hydrogen. "Corresponding" means the same chemical structure, except that the "increased binding energy species" has at least one hydrino atom in place of an ordinary hydrogen atom in the ordinary hydrogen species.

To satisfy condition (ii) above, since hydrino-containing species have higher binding energies, they can form stable compounds for which the corresponding compound containing only ordinary hydrogen is unstable or does not exist. For example, $KHKHCO_3$, in which at least one of the hydrogen atoms is a hydrino atom, has been produced as confirmed by spectroscopic data. See reference nos. 11 in Attachment 79. The corresponding $KHKHCO_3$, in which both hydrogen atoms are ordinary hydrogen, does not exist.

The term "desired energy level" also meets the definiteness requirements of Section 112, second paragraph. The actual claim language recited in claim 9 states "a hydrino atom having a desired energy level." Clearly, the energy levels of hydrino atoms are well described in the present specification, n = ½, 1/3, ¼, etc., and one skilled in the art would be enabled to provide a desired energy level as recited in the claims. Thus, there is nothing vague or indefinite about the term "desired energy level" as used in claim 9.

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[14] Page 8, line 20 through page 9, line 7, of the present specification provides examples of analytical methods that can be used to identify the increased binding energy hydrogen species.

Page 9, line 8 through page 18, line 3, of the present specification discloses numerous examples of increased binding energy hydrogen species.

All of Applicant's claim terms, including those addressed above, are fully supported by the extensive written description and meet the requirements of Section 112. Accordingly, withdrawal of the Section 112 rejection is respectfully requested.

Conclusion

For the foregoing reasons, Applicant respectfully submits that the subject application is in condition for Allowance and should be issued as a U.S. patent immediately. The Secret Committee has not fairly evaluated Applicant's extensive written description and supporting experimental data, nor has it provided any cogent reasons as to why Applicant's invention is not patentable. As shown above, the Secret Committee has not only misapplied the patent laws and rules of procedure, but has gone even further in creating new patent standards that are inapplicable. Applicant has fully satisfied the legal requirements of Sections 101 and 112 according to established case law and the Secret Committee has failed to show otherwise.

Respectfully submitted,

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